# THE JOURNAL OF GAS LIGHTING
## WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXV. No. 1933.] LONDON, MAY 29, 1900. [52ND YEAR. PRICE 6d.



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Brettell's Estate
**FIRE-CLAY & BRICK WORKS,**
**STOURBRIDGE.**

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
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| Yield of Gas per Ton . | 10,500 Cubic Feet. |
| Illuminating Power . . . | 16·4 Candles. |
| Coke . . . . . | 68 per Cent. |

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8 Lombard Street,
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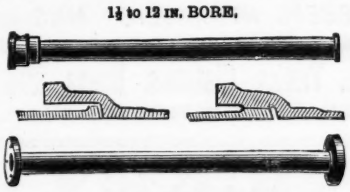
W. RICHARDSON, Fitter.

**GAS AND WATER PIPES**
1¼ to 12 IN. BORE.



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Formerly Springbank Iron-Works, Glasgow.
ESTABLISHED 1848.
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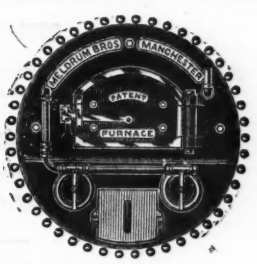


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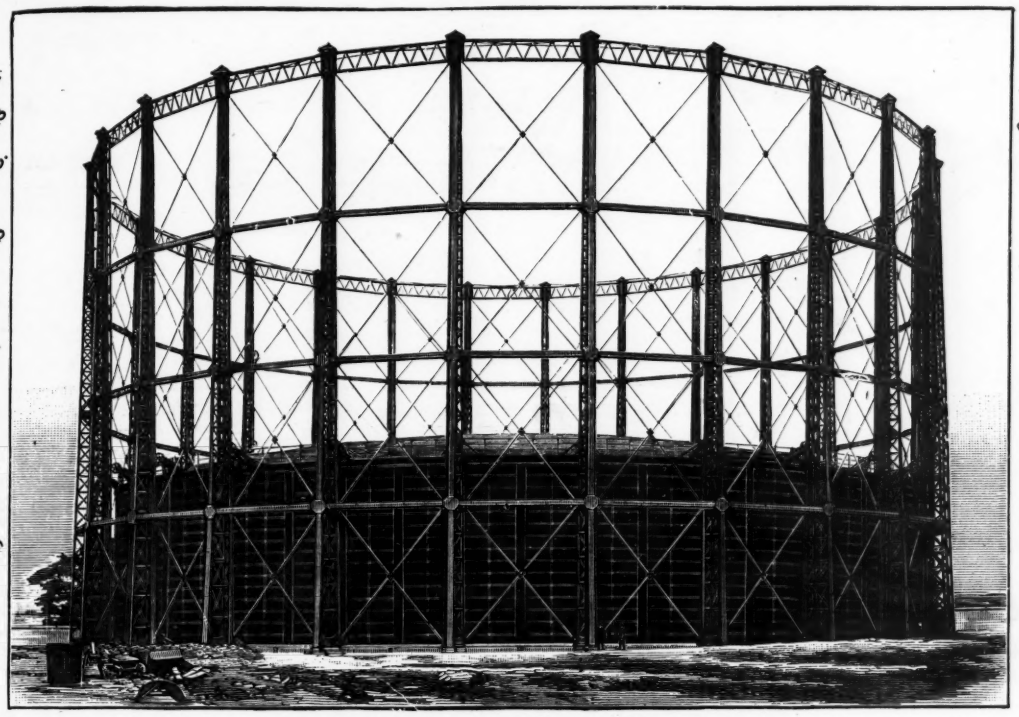

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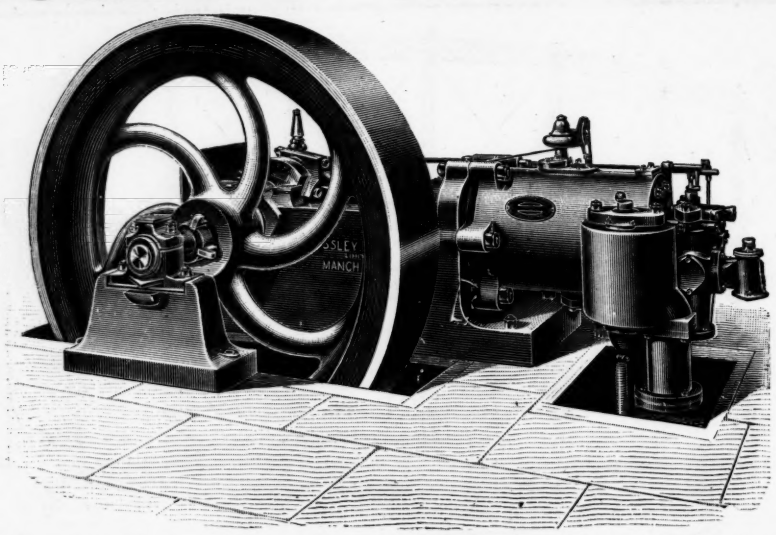

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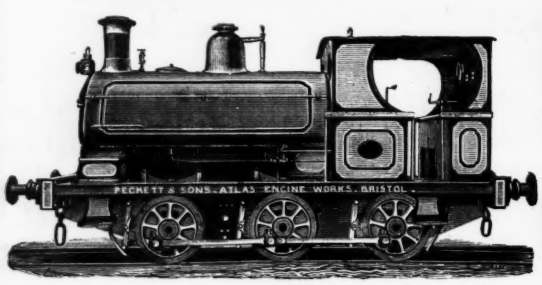


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Improved COAL and COKE HANDLING PLANT, CONVEYORS, and ELEVATORS,

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STRUCTURAL WORK, COLUMNS, GIRDERS, and ROOFING.

GASHOLDERS, Cast-Iron or Steel Tanks.

*DESIGNS, SPECIFICATIONS, and ESTIMATES FREE.*

PIG IRON (Special Quality) for Engine Cylinders, GAS COAL famous for its UNRIVALLED EXCELLENCE.

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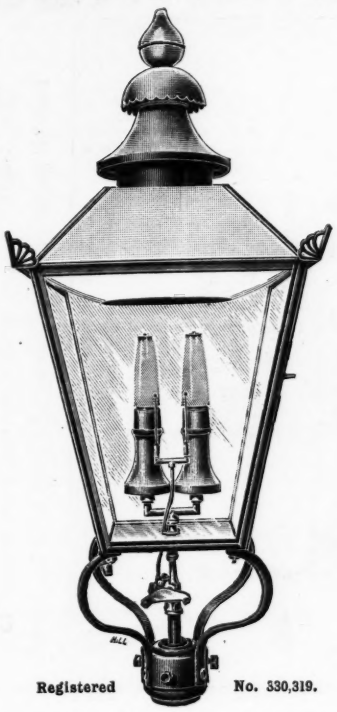

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For use in the

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NIGHT OR DAY.

Hot Bath when wanted.

Boiling Water in a Minute.

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# BOGHEAD CANNEL.

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| Yield of Gas per ton . . . . | 13,155 cub. ft. |
| Illuminating Power . . . . | 38·22 candles. |
| Coke per ton . . . . . | 1,301·83 lbs. |

# EAST PONTOP GAS COAL.

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| Coke . . . . . | 70 per cent. |

# SOUTH PELAW MAIN GAS COAL.

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| Yield of Gas per ton . . . . | 10,500 cub. ft. |
| Illuminating Power . . . . | 16·3 candles. |
| Coke . . . . . | 73·1 per cent. |

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LIME AND COLOUR WASHER.

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PAINTING BY MACHINE.

GREAT SAVING IN TIME, PAINT, AND LABOUR.

Painting Speed— 3 Square Yards a Minute. Lime-Wash Speed— 12 Square Yards a Minute.

Paint Machine, attached to a Single Air-Compressor, Driven by Belt Power. Can also be driven from existing Air-Mains.

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| No. 1 | Painter | £25 | Single Air Compressor | £17 | 10 |
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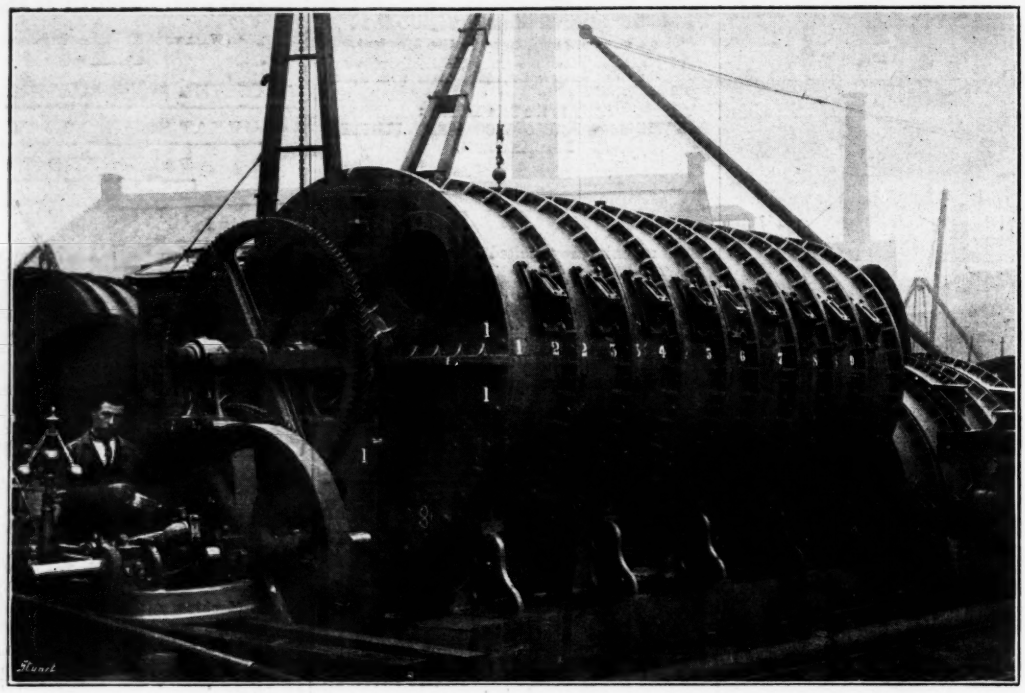
W. C. HOLMES & CO.'S

# PATENT "NEW" SCRUBBER-WASHER

All Sizes from 50,000 to 5,000,000 Cubic Feet of Gas per Day.



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MANUAL
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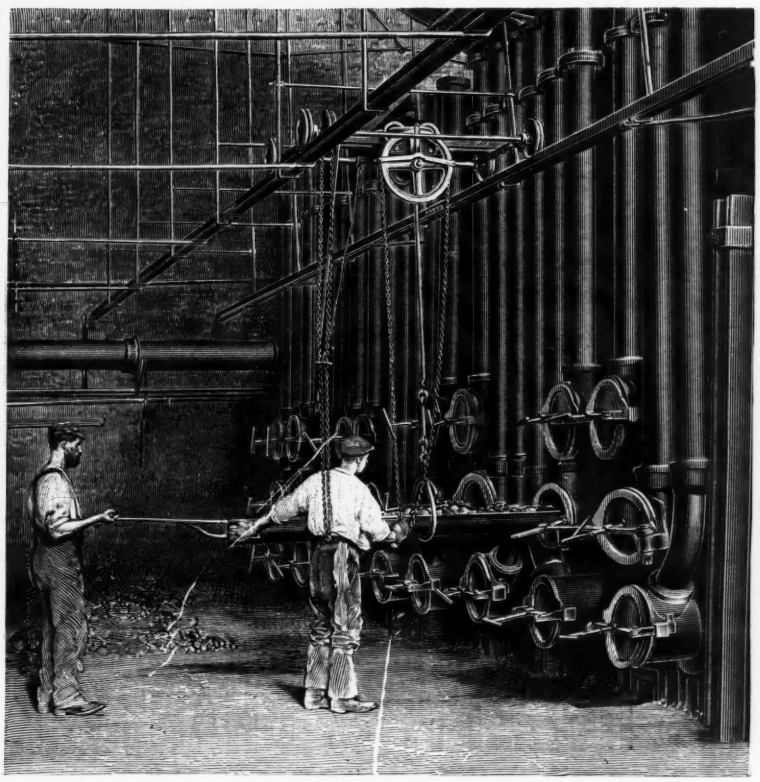

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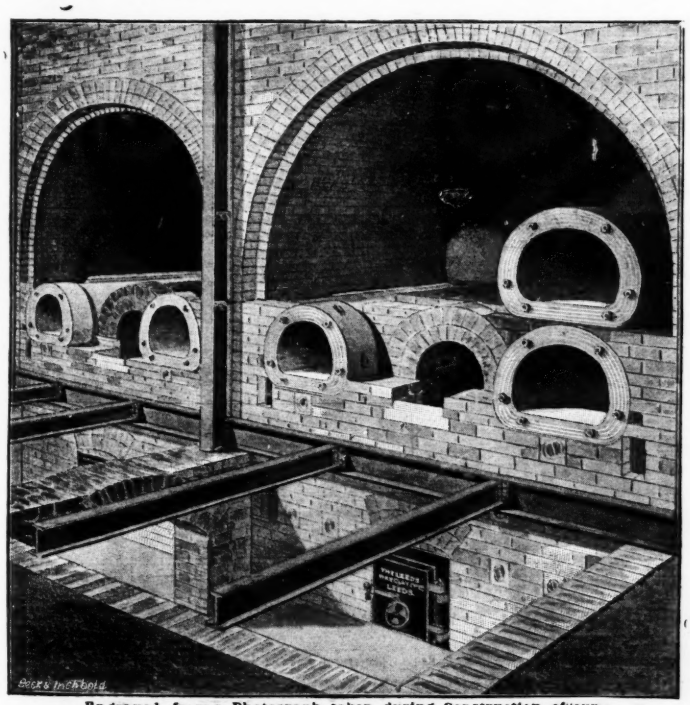

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A SPECIALITY
MANY INSTALLATIONS.
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**which extract ALL the Ammonia and a large proportion of the $CO_2$ and $H_2S$.**

Prevention of Slip of Gas Unwashed.

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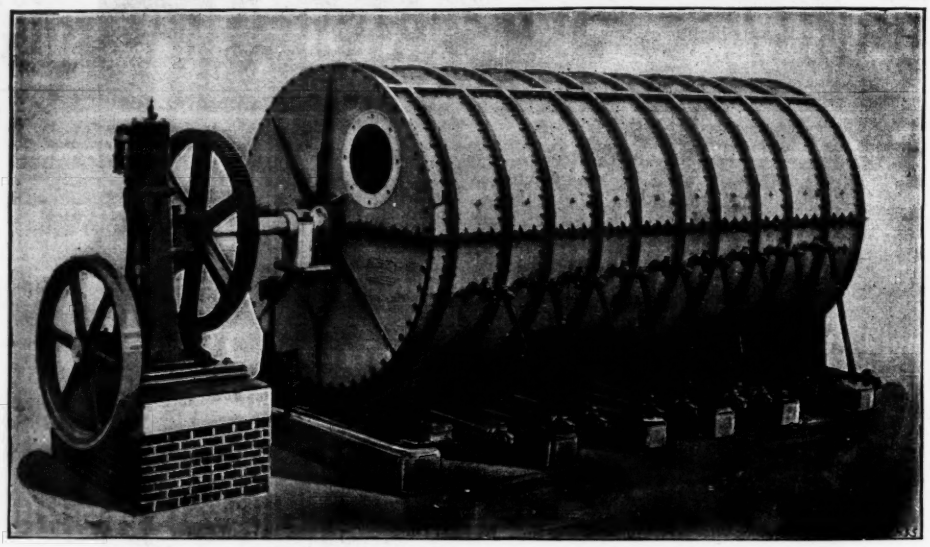

Maximum Washing Surface.

Easy access to interior.

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**WET AND DRY GAS-METERS, STATION METERS, GOVERNORS, GAS APPARATUS, ETC.**

SQUARE STATION METERS WITH PLANED JOINTS.

STATION METERS IN CYLINDRICAL CASES.

DESIGN No. 2 PATTERN.

STATION METERS MADE AT THE COMPANY'S WORKS, OLDHAM (Late WEST & GREGSON). Established 1830.

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| Belfast | 1,700,000 | Bordentown, N.J. | 125,000 | Commercial (Second) | 850,000 |
| Belfast (Second) | 4,500,000 | Winchester | 225,000 | Commercial (Third) | 1,250,000 |
| Brussels | 750,000 | Shanghai | 225,000 | Rotterdam | 850,000 |
| Brussels (Second) | 750,000 | Stockport | 600,000 | Dorking | 150,000 |
| Liverpool | 3,500,000 | Norwich | 1,000,000 | McKeesport, Pa. | 500,000 |
| Liverpool (Second) | 4,500,000 | Holyoke, Mass. | 600,000 | G.L.&C.Co., Bromley | 3,750,000 |
| Tottenham | 750,000 | St. Joseph, Mo. | 750,000 | G.L.&C.Co., Nine Elms. | 2,750,000 |
| Tottenham (Second) | 750,000 | Lea Bridge | 350,000 | Durham | 200,000 |
| Santiago de Cuba | 400,000 | Lea Bridge (Second) | 350,000 | New York | 4,000,000 |
| Swansea | 750,000 | Stockton-on-Tees | 500,000 | Scarborough | 800,000 |
| Manchester | 3,500,000 | Edinburgh | 2,000,000 | Perth, W.A. | 125,000 |
| Brighton | 1,750,000 | Guildford | 350,000 | Bremen | 550,000 |
| Preston | 1,400,000 | Brentford | 1,200,000 | Maidenhead | 225,000 |
| New York | 1,200,000 | Syracuse, N.Y. | 850,000 | Epsom | 225,000 |
| Southport | 750,000 | Bridlington | 150,000 | North Middlesex | 150,000 |
| Bath | 1,000,000 | Middlesbrough | 1,250,000 | Wandsworth | 1,800,000 |
| Newburg, N.Y. | 350,000 | Croydon | 1,250,000 | Aarhus | 800,000 |
| Newburg (Second) | 250,000 | L. & N.W. Ry., Crewe | 700,000 | Falmouth | 150,000 |
| Hoylake | 125,000 | Taunton | 225,000 | Southampton | 800,000 |

## *SINCE JANUARY 1ST, 1899.*

| | | | | | |
|---|---|---|---|---|---|
| Hartlepool | 750,000 | Brussels | 1,000,000 | Staines | 600,000 |
| Utrecht | 1,000,000 | Brighton (Second) | 1,850,000 | Commercial (Fourth) | 2,000,000 |
| Deventer | 150,000 | Stockport (Second) | 600,000 | Dublin (Second) | 2,000,000 |
| Portsmouth | 1,000,000 | Croydon (Second) | 625,000 | Faversham | 200,000 |
| Bournemouth | 1,000,000 | Maidenhead (Second) | 225,000 | Birmingham (Swan V'ge) | 1,500,000 |
| Aylesbury | 150,000 | G.L.&C.Co., Beckton | 2,250,000 | St. Gallen (Switz.) | 225,000 |
| Hamburg | 1,750,000 | G.L.&C.Co., Fulham | 1,750,000 | Colney Hatch | 400,000 |
| Redhill | 275,000 | Tottenham (Third) | 350,000 | Southampton (Second) | 500,000 |
| Dublin | 2,000,000 | Sydney (Harbour) | 500,000 | Tunbridge Wells | 1,000,000 |
| Posen | 450,000 | Sydney (Mortlake) | 500,000 | Hebden Bridge | 200,000 |
| Dunedin (N.Z.) | 150,000 | Manchester (Second) | 3,500,000 | Chorley | 300,000 |
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| Antwerp | 1,500,000 | Longton | 600,000 | | |

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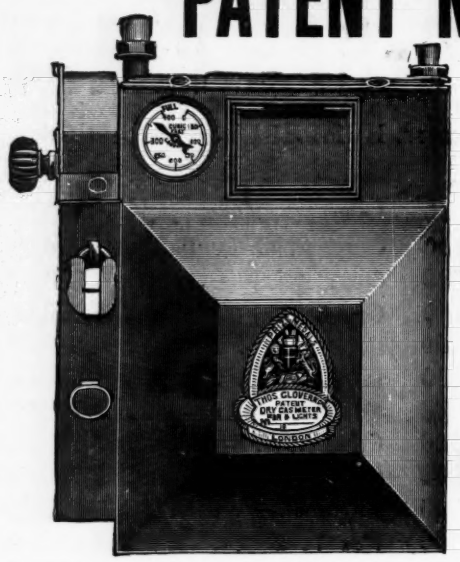

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## CONTENTS.


**EDITORIAL NOTES:—**

GAS, LIGHTING, &c.— PAGE.

The South Metropolitan Gas Bill—A Great Triumph . . . . 1423
The Wandsworth and Putney Gas Bill. . . . . 1424
The Coal Market . . . . . 1424
The Programme of the Gas Institute Meeting . . . . . 1425
The Committee on Municipal Trading. . . . . 1425
The Bank-Rate and the Price of Gas Stocks . . . . . 1425
Another Outrage on Political Economy . . . . . 1426
For the Preservation of the Picturesque . . . . . 1426

WATER AND SANITARY AFFAIRS—

The London County Council and the Water Companies . . . 1427
Birmingham Water Supply—Progress of the Welsh Scheme . . 1427

**ESSAYS, COMMENTARIES, AND REVIEWS:—**

Gas and Water Companies in the Stock Market . . . . . 1428
Electric Lighting Memoranda . . . . . 1428
American Engineering Competition . . . . . 1428
The Paris International Exhibition—A Walk Through. . . . 1430
The Path of Patent Office Reform . . . . . 1432
The Chemistry of Tars and Mineral Oils . . . . . 1433

**NOTES:—**

A Criterion for Pipe-Discharge Formulæ . . . . . 1434
The Action of Water on Asphalte . . . . . 1434
Tough Coal-Tar Paving . . . . . 1434

**TECHNICAL RECORD:—**

The Incorporated Gas Institute—The Programme for the Forthcoming Meeting—The Annual Report and Accounts . . . . 1435
Manchester District Institution of Gas Engineers—Excursion Meeting to Kendal and Windermere . . . . . 1435
Manchester and District Junior Gas Association. . . . . 1435
The Incandescent Gas-Mantle and Its Use. By Vivian B. Lewes, F.I.C., F.C.S. . . . . 1436
Determination of Benzene and Ethylene in Coal Gas . . . . 1439
Water Hammer in Pipes . . . . . 1440

**REGISTER OF PATENTS:—**

Anti-Vibratory Incandescent Burners—Frith, G. H., Bentham, F. H., and Stott, J. H. . . . . 1441
Gas-Engine Exhaust Silencers—New, A. G. . . . . 1441
Street-Lanterns for Incandescent Gas-Burners—Talbot, H. . . 1441
Low-Pressure Incandescent Lighting Apparatus—Sugg, W. . . 1441
Lighting Gas from a Distance—Anspach, J. . . . . 1442
Gas-Engines—Dougill, A.. . . . . 1442
Patent Notices . . . . . 1442

**CORRESPONDENCE:—**

Mr. Carpenter's Paper on Inclined Retorts . . . . . 1443
The Calorimetry of Coal Gas . . . . . 1443

**PARLIAMENTARY INTELLIGENCE:—**

Gleanings from the Committee Rooms. . . . . 1443
House of Lords—Progress of Bills . . . . . 1444
House of Commons—The Supply of Carburetted Water Gas—Progress of Bills . . . . . 1444
House of Commons Committee—
The Gaslight and Coke, Commercial Gas, and South Metropolitan Gas Companies Bill . . . . . 1445
South Metropolitan Gas Company Bill . . . . . 1446
Wandsworth and Putney Gas Bill. . . . . 1449

**LEGAL INTELLIGENCE:—**

The Intimidation of Gas Stokers at Newport (Mon.). . . . . 1454

**MISCELLANEOUS:—**

West Riding Coalowners and Gas Coal Contracts . . . . . 1454
Manchester Corporation Gas Supply—Settlement of the Coal Contracts . . . . . 1454
Birmingham Corporation Gas Supply—The Annual Report of the Committee . . . . . 1454
The Price of Gas at Leeds . . . . . 1455
Stafford Corporation Gas and Electricity Supply—The Past Year's Working; The Bonus Scheme . . . . . 1455
Sales of Stocks and Shares . . . . . 1456
The Gas Supply of New York . . . . . 1456
Electric Lighting Notes . . . . . 1456
Metropolis Water Supply—The Carrying Out of the Intercommunication Scheme . . . . . 1457
The London County Council and the Water Question—An Explanatory Report by the Parliamentary Committee . . . . . 1457
Gas and Water Companies' Stock and Share List . . . . . 1457
The Water Supply of Birmingham—Annual Report; The Elan Valley Works . . . . . 1458
The Tonbridge Local Authorities and the Water Company's Order—Consents Dispensed With . . . . . 1459
Kimberley Water-Works Company. . . . . 1459
Notes from Scotland . . . . . 1460
Current Sales of Gas Products . . . . . 1461
Coal Trade Reports . . . . . 1462

**PARAGRAPHS:—**

PERSONAL: Mr. J. Ferguson Bell . . . . . 1434
OBITUARY: Mr. G. Earl; Mr. Joseph Stanford; Mr. Charles Hooker. . . . . 1434
Society of Engineers—The Work of the City and Guilds of London Institute—A Committee on Patents . . . . . 1427
Preventing the Pollution of the Leeds Water Supply—Bingley Gas Affairs . . . . . 1442
Fatality at the Ashton Gas-Works . . . . . 1444
Increase in the Price of Gas at Newcastle—Gas Poisoning at Bingley . . . . . 1454
Wages of Leeds Gas Workers—Malta and Mediterranean Gas Company, Limited . . . . . 1462
Heywood and Middleton Water Undertaking—The Present Condition of the Coal Market—The Coal Production of the World—A Second Main from Thirlmere to Manchester—The Winsford District Council Propose to Purchase the Gas-Works—Additional Storage for the Lytham Gas-Works—Barnoldswick Gas and Water Supply . . . . . 1463
Birmingham's New Reservoir at Frankley—Coventry Corporation Water-Works—Newbury Corporation Gas Supply—Bradford Gas Discounts and Accounts—Portsmouth Water-Works Company—The Salary of the Plymouth Water Engineer . . . . 1464
Water Charges to Bradford Manufacturers—Formation of a Reservoir Rating Association. . . . . 1465


# EDITORIAL NOTES.

### The South Metropolitan Gas Bill—A Great Triumph.

OUR notes on the proceedings of Mr. Mark Oldroyd's Committee were perforce broken off at a most critical and interesting juncture. We were able to signalize the decision of the Committee accepting the preamble of the South Metropolitan Bill as proved; while remarking that the conditions attached to this acceptance were more stringent upon the Company than those originally submitted in the Bill. The main objects of the promoters were three in number: The first was to give effect, so far as the scope and powers of the South Metropolitan Company extend, to the recommendations of the Powers of Charge Committee of last session. The second was to give the public the advantage of cheap gas, freed from the financial and other burdens of artificial enrichment. The third was to get rid of penalty gas-testing, in favour of a substituted system of ascertaining the average illuminating power of the gas actually supplied, upon which the standard price under the sliding-scale was to be based. As we recorded last week, the Committee approved unreservedly of the first two objects, and overruled the captious and ill-advised opposition of the London County Council. We shall have something to say later as to the character of some of the so-called evidence offered in support of this opposition. The only point in regard to which the promoters failed to convince the Committee of the justice of their views was the proposal to vary the standard price with the average illuminating power.

This the Committee would have none of. Announcing the decision of the Committee, the Chairman said they thought "it would be very unwise and inexpedient that a "floating standard should be adopted." Therefore, with a view to carrying out what they considered the chief object of the Company—to cut down the standard price together with the statutory illuminating power—the Committee suggested that a new fixed standard of 3s. 1d. for 14-candle gas, the testing to remain exactly on the same basis, and to be subject to the same rules as before, would meet the requirements of the case. There the matter stood until last Wednesday. The suggested amended conditions were laid down by the Committee "for acceptance or refusal" by the Company; and when we last wrote on the subject, it was very doubtful whether the Company would be able to accept these conditions, and so save their Bill. The existence of this doubt was pretty clearly indicated in last week's "Editorial Notes."

The Company, as we surmised, were disappointed at the adherence of the Committee to the old system of penalty testing, albeit, as the Chairman of the Committee observed, there would be the great change that the examiners would look for 14-candle instead of 16-candle gas. This means a downward range to 13⅓ candles without penalty, and to 13 candles for a penalty of 40s. This was undoubtedly an enormous gain for the consumers, who would at the same time receive every farthing of whatever economy in the cost of manufacture the change might bring about; but it was not what the Company wanted, especially for the immediate future. No London Gas Company, under existing conditions, can know anything about the manufacture of 14-candle gas—or, to put it more broadly, of unenriched gas of any quality indicated by the photometer. What the Company sought to obtain was complete liberty of action in this regard; and for this they offered to pay, on the ascertained results. The advantages of such liberty to all parties are obvious. The Committee, however, while not oblivious of them, could not bring themselves to allow a statutory Gas Company so much rope. It meant breaking with the whole of our national system of statutory gas examination; and they were unable to create so momentous a precedent on the evidence before them. Far be it from us to dispute the deliberate judgment of a tribunal of such conspicuous competency as this exceptional Committee has proved itself to be; and therefore we will content ourselves with an expression of regret that the cardinal importance attached by the Committee to this point of the fixed data of standard price and illuminating power was not appreciated earlier, when it might have been possible for the Company to have strengthened their case for a change of system.

It almost appeared, for a time, as if the hard-and-fast

prescription of a 3s. 1d. standard price and 14-candle power would wreck the Bill. As a matter of fact, the Company not only do not know how to make 14-candle gas to the best advantage, but they cannot do so even if they would. The artless suggestion of the opposition that gas of 14-candle power and under can always be made at will by the simple expedient of overrunning the exhauster, does not commend itself to gas engineers worthy of the name, who have no fancy for dealing in those expensive gases, nitrogen and carbonic acid. The South Metropolitan Company have a stock of coal bought for the purpose of making 16-candle gas, and the worst of it only needs enrichment by one candle to pass the actual standard. By stopping enrichment altogether, the Company might send out 15½-candle gas from their Durham coal; and, as it happens, they have made a considerable purchase of Yorkshire coal, which will yield 16-candle gas without enrichment. Thus, if the Company had been compelled to take the Bill as it appeared to stand amended at the adjournment on Friday week, they would have been in the awkward predicament of having sacrificed their old initial price while being still compelled, by circumstances beyond their own control, to go on sending out gas of the illuminating power to which the lost standard price properly corresponded.

By Wednesday, however, as everybody hoped, a middle course was found out of what would have been a most regrettable deadlock. The Chairman of the Committee, in the handsomest way, declared that after rising the previous Friday he and his colleagues had been struck with the reflection that their decision seemed to make no allowance for any transition period such as all practical men must allow to be inevitable in the case of a great gas undertaking called upon to readjust itself to new working conditions. Therefore, while adhering to the principle of their decision, the Committee were anxious to hear the promoters on the question of how the adjustment might be made without injury to the Company's interests. Mr. Livesey was accordingly called to the witness-chair again; a feeble protest from the opposition to what Counsel tried to call this reopening of the preamble being effectually quelled by the Chairman. Mr. Livesey had no difficulty in showing the Committee, already in full sympathy with him on the point, that some time must perforce elapse before the Company could adapt themselves to the new conditions. Naturally, the Committee wanted to fix a date, or dates, for the successive drops to 15 and 14 candle power; but Mr. Livesey showed the greatest reluctance to be pinned down to dates. He was willing to engage, in order to get rid of the objection to what had been called the "floating" standard, that the reduction, whenever made, should not be reversed; but the Committee were not to be shaken. Then Mr. Livesey pleaded the cause of the shareholders, many of whom have bought South Metropolitan 4 per cent. stock at 142 or thereabouts, and would undeservedly suffer if the proposed change were made while coal remains so dear. To this line of contention the Chairman was obdurate; and again the prospects of the Bill seemed to be clouded over. The able diplomacy with which this very serious and momentous discussion of the fundamental lines of the most important Gas Bill since 1876 was conducted on both sides of the Committee-room table, was very noteworthy. Mr. Livesey and the Chairman were perfectly matched; and although the issue was for some time doubtful, the evident desire of both to save the Bill eventually composed all differences. Mr. Livesey, having thoroughly sounded the Committee's intentions, took the opportunity of the adjournment for luncheon to consult his colleagues of the Board, who were just then sitting at the Old Kent Road; and his final communication to the Committee on his return was to the effect that the Company would consent to come down to the 15-candle standard as from July 1, 1901, and to the 14-candle standard within four years later. He gave reasons for this delay which satisfied the Committee, who instantly accepted the proposal; and, after a parting shot at the London County Council, which will make it very difficult even for this Bill-loving body to reintroduce their portable photometer scheme, Mr. Livesey carried off his Bill amid the heartiest congratulations of most of those who had been interested in the proceedings, not excepting the members of the Committee. The promotion of the Bill all through was a fine performance, although it may be safely opined that only the personality of Mr. Livesey could have carried to a triumphal issue so sweeping a scheme of reform of the statutory settlement of a London gas undertaking of the first order of magnitude.

### The Wandsworth and Putney Gas Bill.

THE tale of legislative work done by Mr. Oldroyd's Committee was completed by the passing, with amendments offered by the promoters, of the Wandsworth and Putney Gas Company's Bill. This is a very simple and ordinary measure for the conversion of the Company's share capital; its increase by £300,000; and power to acquire additional gas lands. The exceptionally good public record of the Company practically disarmed the perfunctory opposition offered by the London County Council and the Local Authorities of the district. Again, the Committee showed by their dealing with the Bill that economical administration and cheap gas are certain passports to the delectable land of parliamentary favour and protection. The opposition had only the hackneyed old claims to prefer; and these they would not abandon in conference with the promoters, although an opportunity was afforded for the amicable adjustment of real differences. In the event, the Company offered a new testing-station at the Wandsworth District Council Offices; and this concession to photometry was deemed by the Committee to be sufficient. The decision of the Committee to accept the preamble as drafted was a high testimonial to the character of the Company's past and present management. The repulse of the attempt to force the Company into the inner group of London Gas Companies was noteworthy as a confirmation of the precedent of the Crystal Palace District Company's Act; and the successful defence of the Company's standard price for gas was of the utmost significance and value, in all the circumstances of the case.

### The Coal Market.

IT is as yet too early to say what the prospects are as to the probable state of the coal market next winter; but the immediate outlook may be summed up in the remark made a few days since by a dealer on the London Coal Exchange: "There will be no 'summer prices' this year." Reports from the principal centres of the trade all point in the same direction; for although almost every colliery is busily turning out good tonnage, no stocks are accumulating, while there is little coal put on the market for sale except when merchants are disappointed of the requisite shipping for getting their contract deliveries made. Those buyers who are in immediate need of coal, and who have been holding back in the hope of a decline in prices, are consequently obliged to buy at practically whatever price is asked, with the result of hardening the market. The trade with the Baltic is just now in full swing, and the demand from that quarter is unusually heavy; the shortness of fuel in Russia, where industrial activity is very great, being a source of much trouble and anxiety to the Government, who own and run the rapidly developing railway system of the Empire both in Europe and Asia.

So long, therefore, as there is such a ready market for coal abroad, prices at home are little likely to fall, in spite of the decided check to business that is resulting from the dearness of both fuel and metals. It is, then, of interest to note the report that (according to the "Philadelphia "Public Ledger") the Russian Imperial Government have been making overtures to the Berwind-White Coal Mining Company of America for the purchase of nearly half-a-million tons of coal for shipment to the Baltic. No definite sale has been arranged up to the present. But the fact that such negotiations are "in the air" is significant; and their termination in actual business would have no small effect upon the English market. Note may also be taken of the fact reported from Berlin, that in Germany "it is recognized more and more generally that the great "rush of business in the iron industry has passed its "climax." There, as in this country, the manufacturers of finished goods report a decided slackening in orders; and this—unless, as does not seem likely, the check be only temporary—will sooner or later react upon the coal demand. The Glasgow Correspondent of "The Times" especially refers to the fact that new orders are not being received in the iron trade at all equal to old orders as they are completed; the reason given being that "the prices "asked for fuel are practically prohibitive, as consumers "cannot command a proportionate advance in the price "of the manufactured article." The correspondent also reports that several mills have already been stopped owing

to the diversion of orders to the United States. It may then truly be said that the heavens are no longer as brass. The cloud "no bigger than a man's hand" is discernible on the horizon; and though relief to the coal and iron consumer may come tardily, it is even now on the way.

One point in the political economy of the present situation does not appear to have received anything like adequate attention in the Press; and that is—as we have often remarked—that for the existing state of the iron, and consequently of the coal, trade we have in no small degree to thank the constant endeavour of the nations to outvie one another in the magnitude of their navies. So many good people hug themselves with the fallacious idea that the employment of thousands of men in building and manning our vast Navy is "good for trade." So it is—good for the shipbuilding, metal, and coal trades; but for the trade of the country as a whole, emphatically not. It cannot be too plainly stated that every pound so spent is non-productive—being an absolute charge on the wealth of the nation for the protection (not production) of its property. If, in an undue and disproportionate anxiety for his own safety or that of his property, a £40 householder were to employ half-a-dozen men to walk up and down outside his house every day and night, it would be good for those men to be earning their living, but it would be a very expensive luxury for him who employed them; and by the cost of every man with whose services that person was able to bring himself to dispense, he would be so much the richer. We are not, of course, contending (or suggesting) that we can dispense with a ship or even a man from our Navy—it may be that more of both are needed—so long as other countries maintain or increase their sea armaments. The point is that the taxpayers in all countries should realize the price that has to be paid for this apparently unlimited competition in navy-building. The present cost of coal is certainly part of that price. A shilling income-tax is also not without its share therein.

### The Programme of the Gas Institute Meeting.

THE programme of the forthcoming meeting of the Incorporated Gas Institute has been issued, and the full particulars of the official announcement will be found in another column. It will be only a two days' meeting, as regards technical business, commencing at 10.30 a.m. on the 12th prox. at the Royal United Service Institution, Whitehall. The chair will be taken by the President of the Institute, Mr. E. Herbert Stevenson; and immediately after the delivery of the Inaugural Address, resolutions relating to the proposed amalgamation of the Institute with the Institution of Gas Engineers, to form a new national organization, will be dealt with. The papers and communications are much less numerous than usual, as is dictated by the special circumstances of the meeting; but they are all of very fair promise. Mr. W. R. Chester, of Nottingham, will read a paper on "Automatic Stoking "and Inclined Retorts"—a subject on which the last word has certainly still to be said. Mr. A. T. Walmisley, of London, will discourse with authority on "Roofs for "Retort-Houses." Mr. J. Wilkinson, of Drighlington, will expound "Some Disputed Points amongst Gas and "Water Experts;" and Mr. William Young, of Peebles, will treat of "Naphthalene from the Retort to the Point of "Deposition." In addition to these papers, there is to be a lecture on the Wednesday morning by Mr. W. H. Y. Webber, with the enigmatical title, "The New Gas." This technical *pabulum* will be amply sufficient for the short day-and-a-half available for its production and assimilation. On the Wednesday night, the Institute excursion to Paris will begin; and a full programme of travel and Parisian sight-seeing will occupy the rest of the week. A reception at the Gas Pavilion in the Exhibition, upon the invitation of M. Th. Vautier, President of the International Gas Congress, will signalize the last day of the brief trip. All the arrangements have been made with the thoroughness and careful attention to detail for which the Secretary of the Institute—Mr. Walter T. Dunn—is so honourably distinguished; and there need be no fear that the members of the Institute who trust themselves to his guidance will have the smallest reason to regret their confidence. It is to be hoped that the gathering, both in London and in Paris, will be a full one. Subscribers to the Benevolent Fund are reminded that the annual general meeting will be held on Tuesday, the 12th prox., immediately following the morning sitting, at about 1 p.m. This fixture is an improvement on the practice hitherto followed of putting off the Benevolent Fund meeting until late in the afternoon; and a good attendance of the contributors is particularly desired on the present occasion.

### The Committee on "Municipal Trading."

IT is somewhat incomprehensible to those who do not know the little ways of the Municipal Progressive, that the appointment of a Parliamentary Committee to inquire into the subject of trading by municipalities should have been received with much clamour of deprecation from those who profess themselves most fully persuaded as to the expediency of the practice. It might be thought that if the system is all that Progressive fancy paints it, there could be no valid objection to the fact being established to the satisfaction of a Joint Committee, and the confounding of all cavillers outside Parliament. However, it was otherwise; and even when the Committee began their work, one of the choice new journalistic flowers of Progressivism judged it fitting to try to be sarcastically funny, in the style of the halfpenny "comic" newspaper, over the whole business. The matter is nevertheless serious enough—far too weighty, indeed, to be disposed of by an exercise in criticism of the quality that might possibly suffice for the discussion of a personal squabble at a vestry meeting. Sir Henry Fowler, as President of the Royal Statistical Society, chose the subject of "Municipal Finance and "Municipal Enterprise" for his Inaugural Address; and he gave striking figures showing the growth and present extent of the local national debt, which is practically the creation of the century. This important address forms a complete justification of, as well as the best introduction to, the investigation now being conducted by Lord Crewe's Committee. Sir Henry Fowler stated the amount of the local national debt at upwards of 262 millions sterling, of which more than one-half is for absolutely necessary and compulsory purposes. He holds that the local taxation which pays for this burden is "most unfairly levied;" but, inasmuch as this part of the question is now under consideration of a Royal Commission, it must stand over until the Commission has duly reported. So-called "trading" and similar enterprises stand British Local Authorities in 87½ millions of capital, and just pay for themselves.

We shall take another opportunity for discussing what Sir H. Fowler has been able to advance respecting the rights of consumers under municipalization; and for the present we may confine our notice to the Committee proceedings. Sir Courtenay Boyle, for the Board of Trade, was naturally the first witness. He expounded the Parliamentary and Departmental attitude in regard to the supply of gas, water, and tramways, as based on recognition of the undesirability of competing services; while, as regards electricity supply, the rule of limited competition prevails. In speaking of gas supply as an enterprise falling well within the competence of local authorities to undertake, Sir Courtenay Boyle was careful to point out that the gas industry has an important industrial branch in the residuals department, which cannot well be separated from the main business. As regards what is often held to be another branch of a gas undertaking—the dealing in gas consumers' necessaries and accessories—Sir Courtenay Boyle declares that the Board of Trade feel it desirable to draw the line somewhere, in the case of municipalities. The Department does not greatly favour the sale of gas-fittings by municipal gas committees, and is dead against their manufacture. "The Board of Trade had always objected "to corporations being allowed to make or sell fittings. "If the supply of these things was necessarily incidental "to the supply of electricity, it might be permitted; but "not otherwise. For instance, the provision of a good "supply meter (*when one was found*) might well be entrusted to "corporations." The words italicized may be commended to the notice of the "Electrician," which has only recently repeated some disparaging observations, originally made in Germany, on the gas-meter as compared with the ordinary trade electricity meter.

### The Bank-Rate and the Price of Gas Stocks.

THE period of dear money that has lasted from the autumn until recently has now come to an end, though the present easier condition of the market is not, we think, likely to subsist for long. The climax of the period was reached in November; and from the last day of that month until the second Thursday in January—that is to say, for six

weeks—the bank-rate was at the altogether abnormal figure of 6 per cent. It then fell to 5; and on the succeeding Thursdays to 4½ and 4 per cent., at which latter figure it remained until last week. The Directors then reduced the rate still further to 3½, preliminary, in all probability, to a fall to 3 per cent., to which figure the Bank of France have already lowered their rate. This cheapening of money should steady the price of gas stocks; though, so far as the financing of the Companies themselves is concerned, the fall in the rate happens somewhat unfortunately—this being a time when (the money coming in hand over hand for the second winter quarter's consumption, while payments for wages and, as a rule, coals are at the summer level) Gas Companies are more likely to be depositors with, than to be borrowers from, their bankers. Taken as a whole, however, the industry will possibly not, during the next twelve months or so, have much superfluous cash at its disposal; for the high price of coal will necessarily lock up in the coal stores a very much larger amount of floating capital than is utilized in normal times, provided always that the Companies are able to build up such stocks as prudent managers, with last winter's experience fresh in their memory, must wish to have in their hands before facing the always somewhat uncertain demands of the winter season.

To take a normal year, the coal stocks of the three Metropolitan Companies at the end of 1898 totalled up to 375,000 tons. To provide for these stocks on Dec. 31 next, at the prices now ruling, would necessitate the employment of somewhere about £150,000 of additional floating capital. Moreover, as the increases in the price of gas in London—both those announced and those inevitable but not yet determined—will not bring anything near the amount of cash into the coffers of the Companies by the end of the year that will have to be paid away for coal at the higher contract rates, the Companies are likely to be heavy debtors to their bankers when the books are closed on Dec. 31. It is, of course, unnecessary to point out that for issuing fresh stock no time could be more unpropitious than the present; and, under the special circumstances, the bankers of any gas undertaking having a fair margin of unexhausted capital powers should be only too pleased to afford the accommodation necessary to carry the concern through to a more convenient season. It follows therefore that, although undertakings of such credit as Gas Companies should rarely have to pay the full bank-rate on their loans, the price of money during the next year or so will be of more than ordinary importance to gas managers.

Unfortunately, in view of the condition of the Money Market in Germany and Russia, and considering the heavy disbursements of our own Government on the war account, we do not think that the present easement of the Money Market is more than temporary; the probabilities being all in favour of dear money again in the course of three or four months—involving, of course, a tendency to further depression in gas stocks. Meanwhile, to those holders of gas securities who are agitated by the present low price thereof, an article on the subject which appeared in last Saturday's "Economist" may be commended for perusal, especially the concluding remark that, "on the whole, the "gas industry, whether carried on in the United Kingdom "or abroad, has proved a very remunerative form of enter- "prise for investors, and has survived many threats of "partial or total extinction. And it is for investors to "consider whether, in view of the steadily remunerative "character of the industry, a period of temporary depression "may not be their opportunity."

### Another Outrage on Political Economy.

Poor Political Economy—scholastic, not actual—received another staggering blow in the house of its ancient friends, the Liberal Party of this country, last Wednesday. In the "Daily News" of that date may be read a lament that the House of Lords so summarily rejected the Shops (Early Closing) Bill at the instigation of that modern representative of the stern, unbending Individualists, Lord Salisbury! This is really a very interesting sign of the times. We all know the leading points of the Cobdenite philosophy, and how strenuously those who professed to understand and tried to follow it protested against even the Factory Acts as an unwarrantable legislative interference with the principle of the liberty of even women and children to sell their labour as they chose. The world has travelled a long way since that time. Still, it comes with something of a shock when the leading newspaper of the so-called Liberal Party, which professes to hold in direct descent from the great economists of the middle of the century, attacks a Conservative Statesman for demurring to the proposal that the early closing of shops in any district may be imposed on all shopkeepers by a majority vote. Where are we? The "Daily News" says that the Bill with this remarkable object, "whether right or wrong in principle, "is desired by a large class of shop assistants as the only "means of ensuring them a reduction in their excessive "hours of labour"—wherefore it should be passed as a matter of course. Once more, one may well ask, where is that shade of Cobden which is occasionally heard of, in flights of rhetoric, as still frequenting the precincts of the House? It is more to the point, however, to inquire of those who would yoke every amelioration of the lot of working people to an Act of Parliament, to look at the matter all round, and before and after. We are all for humanitarian reforms nowadays. The public taste and the public morality are gradually, but, as we hope and believe, certainly, rising. Is it either expedient or right that, as soon as those things which used to be done or suffered as a matter of course by everybody fall to be considered as the backwardness of a minority, an Act of Parliament must be passed to put them down by sheer force of law? It is the early beginnings of reform which need helping by the Legislature, if possible. When the Saturday half-holiday was being fought for by the British workman; and the early closing movement was being welcomed by a few public-spirited shopkeepers, where was Parliament? With regard to invoking the strong arm of the law to bend to a sanitary or other true reformation some few hopelessly ignorant or reactionary citizens who will not otherwise participate in it, there is something to be said; but many causes are best left outside the direct action of the Legislature. The force of public opinion is the only motive power that makes any law operative; and it can do an infinity of good or evil, as the case may be, without reference to any form of law at all.

### For the Preservation of the Picturesque.

It has already been said of the latest of the trunk line railway extensions to London, now called the "Great "Central," that, whatever their quality as engineering, the bridges, viaducts, and all other structures of this line which might be generally classified as public works, are characterized by the most unmitigated ugliness. They are not merely ugly—they are meanly, crudely, aggressively, and unnecessarily hideous. This soft impeachment of the Great Central railway engineering arouses in thoughtful minds an uncomfortable suspicion that it might be enlarged to embrace most of the latest appliances and appurtenances of modern civilization. How is it that all the newest triumphs of material progress in the adaptation of the forces of Nature to the service of mankind are so undeniably ugly? Not to more than mention the new Charing Cross street arc lamp-posts—the glaring arc light itself, or the thin red line of the incandescent electric lamp in its hard glass integument, is not beautiful as a living flame is beautiful. We would not say that an incandescent gas-mantle is any improvement, as regards looks, on a cheerful flat-flame, even of the much-maligned butcher's "flare." And is the motor car a thing of beauty? Not more so than is the electric tramcar with its overhead strings and the horrible bent pole that connects them. It is well that the newest electric railroads are being put underground; for there they do not offend the eye. So urgent is the need for doing anything and everything that it is possible to do to prevent the unnecessary spoiling of towns in the process of making them more convenient to live in, that it should be strongly recommended to every young engineer and mechanic to keep alive and strengthen in himself the sense of, and natural love for, beauty. We English are not an artistic people; but we need not all sink to the æsthetic level of the Great Central engineers and the St. Martin's Vestry. Every engineer should know something of the principles of architectural design, and learn a little music. Every mechanician should have an appreciation of the treasures of the South Kensington Museum; and keep a soft place in his affections for some branch of natural history. Young engineers have a tendency to get absorbed in the practical side of construction; so that, unless this preoccupation is corrected, they will go and

build a thing like the Lambeth Bridge when they get the chance. Electrical engineers get so obsessed with the charms of the trolley-wire, that they would run it along the Victoria Embankment; and we are only too familiar with the lamp-post, unredeemed by the simplest Art. If life is to be endurable in the cities of the future, this must be altered. Otherwise, as the natural fauna of a country possessing no economical value are preserved as specimens in National Parks, so it will be needful to set aside an English cathedral city and a few prettily-situated villages, and forbid any more civilization of the material kind to touch them. It will soon be too late even for this.

## WATER AND SANITARY AFFAIRS.

THE attitude of the representatives of the London County Council at the inquiry held by Mr. Charles Perrin, on behalf of the Local Government Board, on Monday last week, on the subject of the intercommunication scheme of the associated Water Companies, seemed to indicate a return to something like reasonableness on the part of the Council in regard to the Metropolitan Water Question. For a round dozen of years that body has persistently depreciated the present supply, and inveighed against those who have been entrusted by Parliament with the duty of furnishing it. Yet, with what seems to us to be singular inconsistency, whenever steps have been taken to improve it, they have met with strenuous opposition. When at length, by the intervention of a higher power than that at Spring Gardens, an Act was passed authorizing the coupling-up of the Companies' systems, and the Local Government Board are applied to for sanction to the raising of the necessary money and to the scheme generally, the Council feel that they must needs play the part of the watch-dog. However, it was refreshing to hear their Counsel state that they were not present in any hostile spirit, and that if the Local Government Board were satisfied with the estimates put before them, well and good. Why have they not always acted thus?

Very different was the feeling displayed at the meeting of the Council the following day, when a long report by the Parliamentary Committee recording the fate of the Water Bills, and explaining the various steps taken in the course of the proceedings which led to this result, was formally brought up. It had been on the *agenda* for some few weeks, to allow time for its consideration. It is never an agreeable duty to report defeat, or even reverse, as those who are conducting the present campaign in South Africa have unfortunately had to admit; and consequently the Committee had to make out the best case they could. They claimed for the Council the credit of having used every effort, "in the interests of the ratepayers and water "consumers of London," to obtain a settlement of the water question—going even so far as to offer to modify the proposals contained in their Bills—but with no other result than that of meeting opposition from the Government. We fail to see how they could have expected anything else, in view of the unequivocal terms of the report of the last Royal Commission. Mr. Cornwall, the Chairman of the Committee, declared that the way in which the Council's Water Bills had been treated was "gross "injustice" to London; Sir Arthur Arnold characterized the report of the Commission as a failure; and Mr. John Burns, M.P., favoured his colleagues with one of his vituperative speeches, which had about as much effect upon the parties against whom it was directed as did the "terrible curse" pronounced by a certain celebrated dignitary of the Romish Church against the purloiner of his ring. One member of the Council candidly confessed that he was "sick of the whole business"—a feeling which is doubtless shared by many of the ratepayers, seeing that about £56,000 of their money has, according to Mr. Westacott, been squandered in the fruitless prosecution of Water Bills. But the merry game is by no means ended; for the Water Committee wish to have the Standing Orders suspended, so far as they would affect proposals for legislation next session dealing with the Metropolitan Water Supply, and to be authorized, if they deem it advisable, to recommend applications to Parliament on this subject at any time up to the 13th of November.

About a month ago, we referred to the caution which the Water Committee of the Birmingham Corporation had considered it necessary to give to the consumers against extravagant use of water; and further evidence of anxiety as to maintaining the supply to the city during the coming summer is afforded by the Committee's annual report, the principal portions of which appear in another column. In spite of the restrictive measures adopted last year, by which the consumption of water was reduced, the quantity distributed showed an increase of 6 per cent. on the previous year. As the attempts to find temporary sources of supply have been unsuccessful, and the steps taken to increase the yield of those now available have been productive of only disappointing results, the Committee intimate that further measures of compulsory curtailment of the supply will be imperative if the experience of the last two years is repeated this summer. As an intermittent supply will only be resorted to at the last moment, they appeal to consumers to exercise the most rigid economy in times of drought. In this serious condition of affairs, the progress of the great undertaking which is to bring to the city a supply of water from Wales is watched with keener interest than usual. Unfortunately, the weather during last winter was not favourable for carrying out the works in the Elan Valley; and consequently comparatively little was done in connection with the building of the various dams. During the year ending the 31st of March, a sum of £170,219 was expended on these works, bringing the total outlay up to £829,132. The portion of the aqueduct from Elan to Dolau, which was entrusted to Messrs. John Aird and Sons, is practically finished; and progress is being made with the other sections, though it is not quite so fast as could be desired. As no relief can be afforded by any intercommunication system in Birmingham, everybody concerned—Water Committee and consumers alike—will rejoice at the speedy completion of this important scheme of water supply. But unforeseen difficulties have arisen, and they have only been overcome by skilful engineering and an additional expenditure of about £30,000. It is to be hoped the work will now go on steadily until the end.

**Society of Engineers.**—We have received from the Secretary of the Society (Mr. Perry F. Nursey) the volume of Transactions for the past year. It is a book of 258 pages, with a goodly number of folding plates. Of the seven papers read during the session, only one—"Water Supply to Country Mansions and Estates," by Mr. Gordon Harris—was on a subject in which our readers are directly interested. Among the obituary notices, reference is made to the career of the late Mr. W. H. H. Broadberry, who was elected a member of the Society in 1881. At the end of the volume is the general index to the Transactions from 1857 to 1899. The book has been produced under the editorship of Mr. Nursey.

**The Work of the City and Guilds of London Institute.**—We learn from the annual report of the above-named Institute that at the Central Technical College there were at the last winter term 272 students, of whom 115 took the civil and mechanical engineering course, 94 the electrical engineering course, 24 the chemical course, and 39 the special course. At the close of the session, the diploma of the Institute was awarded to 39 matriculated third-year students. The gross amount of fees received from the students during the year was £6797, of which £467 was remitted in the form of studentships. The cost of the College in excess of the amount received from students' fees was £5813. At the Finsbury Technical College last session there were 180 day students, against 185 in the previous year; and the evening classes were attended by 649, against 760. The report was adopted at the annual meeting of the Institute, held at the Mercers' Hall, Cheapside, last Wednesday, under the presidency of the Lord Chancellor.

**A Committee on Patents.**—The Board of Trade have appointed a Departmental Committee on Patents, to consist of Sir E. Fry (Chairman), Sir R. Webster (Master of the Rolls), Sir E. Carson (Solicitor-General), Sir W. H. Houldsworth, Bart., M.P., Mr. F. J. S. Hopwood, C.B., C.M.G., Mr. S. E. Spring Rice, C.B., Mr. J. Fletcher Moulton, Q.C., M.P., Colonel T. W. Harding, Mr. E. Carpmael, and Mr. H. Hughes. The Committee are to inquire into the working of the Patents Acts with reference to the following questions: (1) Whether any, and, if so, what, additional powers should be given to the Patent Office to control, impose conditions on, or otherwise limit the issue of letters patent in respect of inventions which are obviously old, or which the information recorded in the Office shows to have been previously protected by letters patent in this country. (2) Whether any, and, if so, what, amendments are necessary in the provisions of section 22 of the Patents, &c., Act, 1883. (3) Whether the period of seven months' priority allowed by section 103 of that Act to applicants for letters patent under the International Convention may properly be extended; and, if so, on what conditions. Mr. Arthur Paget has been appointed to act as Secretary to the Committee.

# ESSAYS, COMMENTARIES, AND REVIEWS.

## GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 1457.)

THE state of affairs in the Stock Exchange last week was most disappointing. Everything was quite listless and inanimate; and dulness prevailed in every department. For weeks people have been saying, "Wait till Roberts makes genuine progress, and the end of the war is in sight," and, "Wait till we get money a bit cheaper, then we shall have our good times back again." And now that both conditions have been satisfied, it is provoking to find that the public will not move, as if rusted into immobility. Indeed, new factors of disturbance arose last week to impede enterprise; and Politics and the Plague were held up as bogies to frighten the timid investor. Of course, prices all round have had a further drop; and only here and there can any special exemption be found. In the Money Market, the most important item was the reduction of the Bank of England rate to 3½ per cent. from the 4 per cent. rate, which had reigned for exactly four months. The sudden and unexpected influx of gold rendered it inevitable, though there had been nothing to indicate the approaching change. Business in the Gas Market showed a very fair degree of activity, especially as compared with the general run of the markets; but transactions were to a considerable extent restricted to a few of the leading issues. Changes in quotation were few in number, and slight in degree; and though they were (again with one conspicuous exception) in the downward direction, there seems to be an approaching tendency to steadiness, as if the lowering of quotations in agreement with announced advances in the price of gas had gone far enough. In Gaslights, there was a further fall, as might be expected; but nothing much to speak of. The ordinary opened at 97, and was done once specially as low as 95; but this figure did not recur. Moderate business was done in the secured issues at lower prices. South Metropolitan was fairly active, and advanced another point. The triumphant passage of the Company's Bill—the first nail in the coffin of that costly extravagance, artificially enriched gas—is not yet generally understood. Commercials were quiet and unchanged. Very little was done in the Suburban and Provincial group; and movements were confined to a fall in British and Tottenham "B." Business in the Continental Companies was very quiet. Imperial gained a point, but lost it again; and Union was a little easier. Nothing occurred among the remoter undertakings. The Water Companies were almost devoid of incident; and the only changes were slight reductions in East London and Grand Junction.

The daily operations were: Business on Monday was almost all in Gaslight and South Metropolitan. The latter advanced 1; but Gaslight preference fell 1. Tuesday's transactions were much the same. Gaslight ordinary and debenture relapsed ½ each, and Continental Union 2½; but Imperial rose 1. Business continued fairly brisk on Wednesday. Tottenham "B" fell 2. In Water, Grand Junction dropped 1. Thursday was a little quieter; and the only change was a fall of ½ in British. Friday was the quietest day of the week; and nothing moved at all. On Saturday, there was considerable dealing in Gaslights at unchanged figures. Imperial lost the point it had been advanced. In Water, East London fell 2.

## ELECTRIC LIGHTING MEMORANDA.

**Rejection of the Manchester-Liverpool Express Electric Railway Bill—The Electric Lighting of Dublin by a New Company—The Estimates of Cost of Electricity Generation in Bulk.**

ANOTHER salutary lesson to promoters of "wild-cat" schemes, electrical or otherwise, has been given by the rejection of the Bill for the "monorail" express electric railway between Manchester and Liverpool. It is satisfactory to know that the Committee threw out the Bill strictly on the merits, and not as a concession to municipal or any other kind of obstruction. It is very remarkable how open-minded most Parliamentary Committees are becoming. They are no longer slaves to precedent, and give proof that the average member of Parliament is better able to do good work on Select Committees now that he is not required to dance attendance on the rhetoricians of the House far into the small hours of the morning. This by the way. On the so-called "monorail" express line, the Committee decided that the idea is probably a good one; but the particular scheme before them was seriously incomplete in several most important respects. For one thing nobody could say convincingly what was likely to happen if an attempt was made to quickly bring to a standstill a train running at the high rate of speed proposed. It sounds odd that so obvious a consideration was not thoroughly gone into before the matter was brought into Parliament. Another objection lay in the nature of the proposed line of communication, as an overhead affair throughout. It has been plainly shown, as the Committee justly observe, that the principle of underground penetration to the heart of great cities is the least objectionable, and therefore it is to be preferred wherever practicable. The combined weaknesses of the overhead arrangement, and the uncertainty about the brake power, were too much for the scheme to live through; and, accordingly, it has collapsed, not much regretted by anybody.

A curious three-cornered fight has been going on over the future of electric lighting for Dublin. A Company, composed of some well-known local people, some of whom are also interested in the Dublin United Tramways Company, seek incorporation for the purpose of supplying the city with electricity for lighting purposes. This service is actually being performed by the Corporation, in a small and not very successful way; but, as we have had occasion to mention in this column, there is in contemplation a large scheme of extension of the Corporation undertaking under the direction of Mr. Robert Hammond. Mr. Balfour Browne, Q.C., had a pretty tale of this enterprise to tell the Committee. It was objected to the Company that they were really an off-shoot of the Tramways Company, whose attempt to get possession of the Dublin electric lighting failed. Consequently, it was easy to argue that what the Tramways Company had been prevented from doing themselves, directly, they were seeking to attain indirectly by the formation of this Company. The occurrence of certain prominent names on the Boards of both Companies lent colour to this contention. The Committee therefore found themselves confronted by at least three different interests. Here again, however, the Committee exhibited a notable desire to do what is best for the public, regardless of political considerations, or municipal "principles." Several important persons were called to inform the Committee that they preferred to see electric lighting in the hands of corporations rather than of private companies; but, astonishing to relate, the Committee declared the preamble of the Bill proved! It was probably the masterly evidence of Mr. H. F. Parshall in support of the Company's scheme that won over the Committee. This is for a direct-current service at 440 volts, vouched for by Mr. Parshall as being more efficient and serviceable, both for lighting and power purposes, than the alternating system as favoured by the Corporation. Against this ably-put evidence, the rival Corporation proposal made a very weak showing, although supported by Mr. Robert Hammond and Professor Silvanus P. Thompson. Of course, the Lord Mayor of Dublin declared that the Corporation meant to keep the electric lighting in their hands, and would still go on with their proposed extension scheme at the estimated cost of £254,000; but the Committee were not frightened. If the Corporation are stubborn enough to spend the money of the ratepayers on a competing scheme, and if the ratepayers are willing to let this be done, Dublin ought at least to be well off for cheap electricity. In view of the fact that the Committee inserted a purchase clause in the Bill, for the benefit of the Corporation, the waste of competition may after all be avoided. The chief interest of this decision for outsiders lies in the wholesome set-back it administers to the "principle" of Municipalism where merit is absent.

The Committee on the electricity-in-bulk schemes is laboriously working through these Bills. The Chairman has already got to the point of announcing that the value of electrical energy as a form of power for use in the national industries has been amply demonstrated; so that the parties need not pile up any more scientific evidence on this head. The Committee wants to get at the merits of electricity generation in bulk; but a vast accumulation of incidental considerations has first to be cleared away. In this matter, it is more than usually difficult to see the wood for the trees. Mr. F. E. Gripper, of Edmundson's Electricity Corporation, has been able to state that, with the exception of Niagara, electricity on a large scale can nowhere be generated more cheaply than in Lancashire. The statement probably applies equally to all coalfields. In Lancashire, at any rate, assuming a load factor of 25 per cent., Mr. Gripper estimates that a station with a capacity of 12,500 kilowatts will be able to generate and distribute electricity at a cost of 0·7d. per unit. Mr. Ferranti's estimate for the same thing in Durham is 0·65d. per unit, with nothing said about the load-factor. Mr. Swinburne advocates for the Tyneside, electricity generation in units of 4000 or 5000 horse power as a convenient commencement for a supply "in bulk;" but he does not appear to have stated the approximate cost per unit. If any of these schemes are realized, the result of correcting promise by performance will certainly be instructive.

## AMERICAN ENGINEERING COMPETITION.

PASSING reference has already been made in the "JOURNAL" to a very interesting series of articles which have been appearing of late in "The Times" under the above title—articles written by a Special Correspondent of that paper who has recently visited the United States—and we now propose to consider some of the facts adduced and inferences drawn by the writer, as the subject is one of considerable importance to the gas industry from more points of view than one. In the first place, gas companies, as very considerable buyers of iron and steel goods, are, at the present moment, suffering severely from the high prices ruling for plant, machinery, and iron, steel, and tin goods of every kind. Those high prices being due to the excess of demand over supply, the question of the possibility of imports from America redressing the balance of the market, and thereby reducing prices to normal levels, is of no small importance. In the second place, the condition of the iron and steel market, not only here but also on the Continent and in America, being largely responsible for the abnormal price of coal, the future of that market in the States—which exercises

daily more and more influence on the English and European trade—is a matter of great interest to coal consumers. Finally, the process of gas manufacture involving much engineering skill, it is essential that those concerned in the industry should consider whether they have anything to learn, in regard especially to enterprise, fertility of resource, and originality, from that most astute of men, the American Engineer.

In regard to the probability of American manufacturers entering to a material extent into active competition with English iron and steel goods makers, not only in foreign markets but in our own, "The Times" correspondent is firmly of opinion that such an event is only a question of time. As the result of his observations, he says:

> As soon as supply overtakes demand in the United States, it is the fixed determination of American manufacturers to attack us vigorously in the neutral markets of the world, and even in our own home market. A prominent American steel maker—the head of one of the most important corporations in the country—recently declared in public that he would supply rails for abroad at cost price, simply to retain a hold on the market for use in duller times. In following out this policy, the Americans will rely largely on their protective tariff. It is their intention, when the reaction in trade comes, to keep up values in America by stinting the supply to the home market, and to force the export trade by cutting prices for foreign countries. That is the avowed intention of manufacturers with whom I have conversed; and the systems of combines, trusts, consolidations—or whatever name may be given to these recent wholesale amalgamations of factories—will render such tactics possible.

That is to say, the English consumer will benefit at the expense of the American. It will be of great interest in the years to come to see for how long the American consumer will allow himself to be fleeced at the will of the manufacturing trust, and to watch the growth—inevitable, though it may be long delayed—of Free Trade principles in the States. For the present, the question is: When will "the reaction in trade" over there make itself evident? Writing apparently at the beginning of the year, "The Times" correspondent did not anticipate any reaction in the near future. He said:

> At the present moment, American manufacturers of all classes have more than they can do to keep pace with the home demand; and this is more especially true of iron and steel makers. During a tour through the chief manufacturing States of the Union . . . I found everywhere the same tale of blooming prosperity, works of all kinds full of orders for a year or more ahead; old works being enlarged and new works being started. Never anywhere has there been such a period of commercial expansion since the factory system was established. Naturally in this way supply and demand act and react on each other, so that the ball may be kept merrily rolling for a long time yet. But some day . . . America will awake to the fact that she has more blast-furnaces, more steel-mills, more factories of all kinds, than the country demands for its existing need.

In spite of this apparent promise of full occupation for the whole of this year, our impression, strengthened by reading the articles before us, is that the Americans are so strenuously active, and design, erect, and set going new works and plant with such astonishing rapidity, that production is fast overhauling consumption, and that an overflow of surplus manufactures may pour into foreign, if not into our home, markets before many months are out. One of the causes of the great activity in the iron trade in the United States during the past two or three years, leading to the tremendous and rapid increase of factories and plant which "The Times" correspondent records, is to be found in the enormous amount of railway construction that has been in progress, no less than 3000 miles of new railway having been laid in the United States in 1898, and as many if not more in 1899. This extension of the railway systems in that country cannot, however, proceed indefinitely; and a falling away from the present phenomenal demand must inevitably result in the owners of the surplus plant turning their attention more and more to the export trade.

As to the question of whether Britain or the United States is commercially supreme, it is pointed out that the volume of business done is not a fair basis of comparison, unless the relative populations be taken into account; and that, looked at from this point of view, the still existing industrial supremacy of Britain is apparent. The imports per head of the population in 1898 were £1 13s. in America, compared with £11 14s. 1d. in Great Britain; and the exports, £3 7s. 9d. per head, as against our £5 16s. 2d. We are warned, however, in the following remarks, to look rather at the future than at the past:

> Those who rely wholly on statistics lean too much on the past. They think that when their tables do not supply instances, instances cannot exist. Such an attitude ignores change and the possibility of change; it is as if Adam had forecast the coming birth-rate upon data collected before the Fall. That is an attitude the British mind is a little too apt to take. British manufacturers and merchants ought not, therefore, to trust overmuch to "returns." They should visit other countries, more especially America, to see what facilities there are for production in this new land, and what sort of people it is with whom they will have to cope.

We are far from thinking that the American manufacturer is going to cut the Englishman out in his own market—at any rate, not for more than a short time. But it will be necessary for the competition to be smartly felt before our manufacturers will really stir themselves to meet it. We have had the markets of the world too much at our disposal in the past—business has fallen into our lap, so to speak, too constantly—for the English merchant to need to exert the whole of his capacity, or to sufficiently study the needs of his consumers. Just as the competition of electric lighting has aroused the gas industry from its lethargy and its *laissez faire* attitude—to the great benefit of both shareholder and consumer—while the pessimistic prognostications of those who, twenty years ago, would have us believe that the end of the business of gas supply was at hand, have been completely falsified, so the competition of American producers with English will, we believe, infuse new life into our own engineering and manufacturing centres, giving birth to improved processes, and therefore cheapened products, with advantages all round.

Apart, however, from the question of the benefit that consumers of iron and steel goods, and moreover the users of coal, must derive from the competition of American manufactures with our own, there are many points worth noting from the articles before us as to the differences observed by the writer between American methods, both in the production of their goods and in the selling of them. One most striking characteristic of the American producer—constantly emphasized in the accounts given by "The Times" correspondent of his visits to the various principal works in the States—is his readiness to immediately abandon good methods of production for new and better; preferring to sacrifice the capital spent on the discarded plant at once, rather than lose his customers eventually. Another secret of his success—one noted now not for the first time—is his constant, unceasing study, and attempted anticipation, of his customers' requirements. Speaking of the Tonawanda Iron-Works at Buffalo, the correspondent says:

> They teach that it is only by liberal if judicious expenditure of capital in maintaining plant in most efficient condition, and by studying the special needs of purchasers, that we can keep our hold on any trade. In spite of distance, and in spite of ancient prestige, we shall be beaten unless some of us wake up to the fact that obsolete appliances, old, slow methods, and the old carelessness of customers' needs, must give place to something more businesslike and more intelligent.

There are still not a few gas undertakings that might with great advantage realize the need of this substitution of new for antiquated methods alike of manufacture and of business. As an instance of the American method of meeting new custom more than half way may be mentioned the fact that the world-famed Carnegie Company, who employ over a hundred draughtsmen at their Pittsburg office, "will furnish designs for a building containing thousands of tons of steel, and make no charge for the design if they get the contract for the material." It is truly observed that "this is a marked contrast to our usual procedure with heavy architects' fees."

One of the most noticeable features of American works is the substitution, at every possible point, of machinery for manual labour. Again and again our contemporary's correspondent notes the marked absence of hands from the buildings where thousands of tons of material are being dealt with. He writes:

> Nothing seemed to me more notable at the Duquesne works than their *loneliness*. Had it not been for the subdued hum, characteristic of a furnace in blast, and the rush of waste water from the tuyeres, one might have thought the works were shut down. This is seen, more or less, throughout the United States, where great effort is made in all productive industries towards the replacement of human labour by mechanical appliances. From the humblest kitchen to the mammoth factory—from peeling apples or washing plates to heaping tons of coke and ore into a blast-furnace—the American always strives to do what he can by machinery; and the inevitable consequences are that labour is better paid, and that there is more demand for it, than in any other country. "For anything that can be done without thinking, we want to use a machine, so that men can be set free to work the best part of them—their brains." That is the position taken by the American. It is this that chiefly accounts for the apparent anomaly of high wages and cheap labour—that is, cheap in terms of the product.

It is obvious that, in some respects at least, Trade Unionists in the States must have much more enlightened views as to their own best interests than have their British brethren.

In illustration of the pitch of perfection to which methods of unloading ships have been brought, may be cited the ore-landing plant at Lorain, where 6000 tons of ore have been taken out of one ship and deposited on the stock heaps in twelve hours, at a cost of between ¼d. and ½d. per ton. Again, at the Illinois Steel Company's works, a vessel of 7000 tons is generally unloaded in from 11 to 12 hours:

> A vessel would be filled in about four hours; but the work had been performed in two hours. . . . It will be seen by those acquainted with the mineral industries of Europe that the methods of handling material adopted in the United States differ essentially from those in vogue on this side of the Atlantic. To a large extent the Americans have been forced by circumstances into new departures and improved methods, by geographical considerations, and the exigencies of their position. None the less, credit is due to them; and it is credit that no fair-minded Englishman will withhold. The ingenuity they have displayed and the courage they have shown in tackling difficulties during the uphill fight in putting their steel industry on a footing to compete with our own in neutral markets is worthy of all praise and admiration.

We agree; but would add that we have every faith that eventually, when the pinch of American competition is really felt, the English manufacturer will display equal ingenuity and courage, and will hold his own against his shrewd and intrepid competitor. But he will have a rough awakening, and will pass through a very bad time, before he can make up the lee-way he is at present more and more quickly making.

Before leaving, at any rate for the present, these very interesting articles—which we should like to see reproduced in book form, when they would be much more likely to be widely read—we will make one quotation for the benefit of Great George Street and elsewhere:

> Although we have in England a larger and more influential class of Engineers who sell only advice, I think on the whole, very much more advice is sought in America. The broad difference is that British advice is manufactured largely in offices unconnected with works; in America it is chiefly the product of the workshop.

We need not enlarge upon the point.

## THE PARIS INTERNATIONAL EXHIBITION.

### A Walk Through.

THE visitor to Paris who purposes devoting only one day to the Exhibition will find he has before him a task for the accomplishment of which a considerable amount of physical and mental endurance will be needed. The area to be covered is so vast, and the objects to be looked at so multifarious, that the powers of locomotion and the visual and perceptive faculties are alike taxed to their fullest capacity. For, without the slightest intention of perpetrating a very bad pun, there is unquestionably a considerable "eye-full" to take in on the banks of the Seine, as the present Exhibition covers a very much larger space than that occupied by any of those previously held in Paris. It is rather curious that, although we are in the habit of regarding the latter half of this century as what might be called the Exhibition Period in the history of nations—the impetus being given to the movement by the great show which was held in Hyde Park in 1851—the idea did not originate in this country, nor were we the first to carry it out. In point of fact, industrial exhibitions began with the French; the earliest recorded being held in Paris in 1798. Ten others followed at various periods down to 1849; the last exceeding all its predecessors in extent and brilliancy. It must have presented a striking contrast to the scenes witnessed the previous year, when the city was in a state of siege! The next Exhibition was the one which followed closely upon the World's Fair in Hyde Park—namely, that held in the Palais de l'Industrie, in the Champs Elysées, in 1855. This building, which has been removed to make way for the two beautiful palaces devoted to the Fine Arts which form part of the present Exhibition, was rectangular in form—270 yards long, 118 yards wide, and 114 feet high; the handsomest portion being the pavilion in front, towards the Avenue des Champs Elysées, which occupied nearly one-third of the length. The entire superficial area was about 202,000 square yards, or 42 acres, of which 144,000 square yards were covered. This structure sufficed to contain the exhibits in Paris five-and-forty years ago.

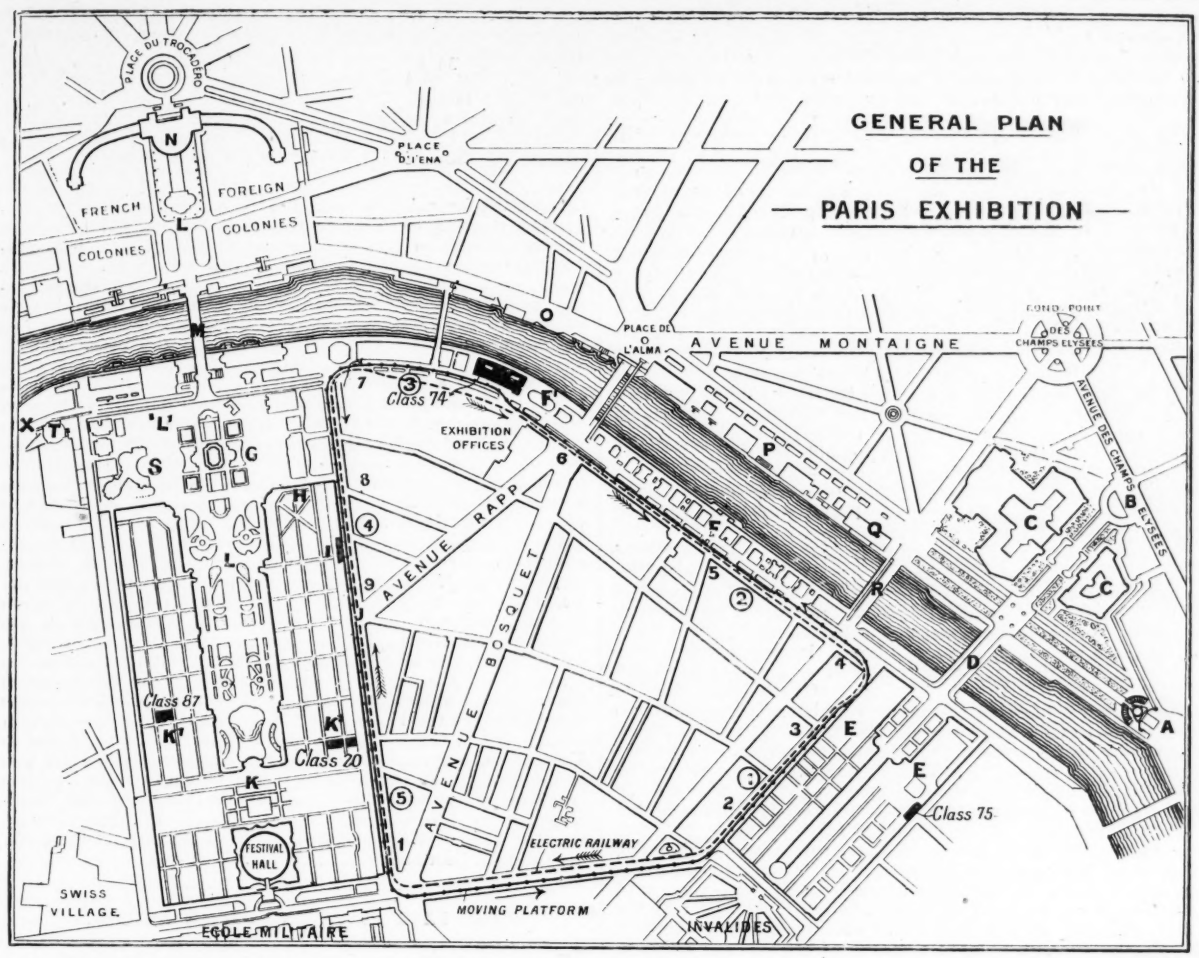
Nothing more was done until 1867, when the large space in front of the Military School, appropriately named the Champ de Mars, and the scene of so many brilliant displays to the glorification of War, was utilized in the more beneficent cause of Peace. This exhibition occupied a superficial area of 825,000 square yards, or about 170 acres. Eleven years later—viz., in 1878—another was held on the same spot, with an extension across the river to the Trocadéro Palace; the total area occupied being 900,000 square yards, or about 187 acres. After the lapse of a similar period, Paris, in 1889, invited the world to another Exhibition—this one upon a still larger scale; the Esplanade in front of the Invalides and a portion of the quays on the left bank of the Seine being requisitioned in addition to the ground occupied in 1878. The superficial area of this Exhibition was 207 acres. The present Exhibition comprises not only the area occupied in 1889, but also parts of the Champs Elysées and the right bank of the river, covering 277 acres, together with an annex in the Park at Vincennes, covering 272 acres; making a total of 549 acres. The strip of land, on either side of the river, devoted to the Exhibition extends for a distance of $1\frac{1}{3}$ miles; and on the entire site about 175 foreign pavilions and detached buildings have been erected, without reckoning the 36 official pavilions of nations participating in the Exhibition, constructed in a double row on the Quai d'Orsay, on the left bank. The "lie" of the several buildings in regard to the entire collection, and of the Exhibition as a whole in regard to the city, will be readily seen from the accompanying plan.

Having given an indication of the extent of the Exhibition, a few remarks may be made as to the arrangement of the exhibits. These have been classified into 18 groups, subdivided into 121 classes. In their arrangement, the method adopted appears to have been to show visitors on one site all the products of a similar nature, whatever their origin. Instead, therefore, of there being one British Section, with one or several buildings exclusively devoted to all the products of British industry, visitors will find the latter competing side by side with similar products of other nations in various parts of the Exhibition. Another feature is the attempt to represent together on one site, as far as possible, the raw material, processes of manufacture, and finished products of an industry. It has therefore been necessary to show machinery in conjunction with the finished article, so as to illustrate the method of producing it. Moving machinery will consequently be found all over the Exhibition—an advantage which has been capable of realization only by the use of electricity as the motive power, which has permitted of a large quantity of shafting being dispensed with. The groups in which readers of the "JOURNAL" are more or less interested are the following: Group IV., Mechanical Engineering (Classes 19—22); Group V., Electricity (Classes 23—27); Group VI., Civil Engineering (Classes 28—34); Group XI., Mining and Metallurgy (Classes 63—65); Group XII., Decoration and Furniture (Classes 66—75); and Group XIV., Chemical Industries (Classes 87—91). Their special attention will probably be given to the exhibits in the following classes: Class 20, gas-engines; Class 74, gas heating appliances; Class 75, gas-fittings and other lighting apparatus; and Class 87, materials employed in the manufacture of gas. In addition to the exhibits in the respective groups, separate buildings for making special displays have been erected in various parts of the grounds; and the one which contains the collective gas exhibit was described in the "JOURNAL" last week (p. 1356). It will be manifest, from the foregoing brief indication of the extent of the Exhibition, that two or even three days should be given to visiting it, if it is desired to obtain a good general idea of the contents. If, however, interest centres in certain sections only, of course two days, or even a single day, would suffice. We will assume, for the present, that the visitor wishes to see the entire Exhibition, and will endeavour to show how this may be done without going over the same ground several times.

There are upwards of fifty entrances to the Exhibition; the principal one—called the Monumental Gate—being on the Place de la Concorde. It consists of three arches forming a triangle, and supporting a dome, 100 feet high, which will shelter 2000 people waiting for admission. Above the central arch, on either side of which is a tall minaret, is a figure by M. Paul Moreau-Vauthier, which is stated, in the grandiloquent language of a French writer, to represent Paris welcoming her guests. In the niches on either side are fountains surmounted by colossal statues of Electricity. As no money is taken at the entrances, the visitor will have to purchase a ticket outside, for which, although marked "1 franc," he must be careful not to pay more than 60 c., unless he wishes to incur the derision of his friends. Armed with this little billet, he arrives by one of the numerous railed-off avenues, arranged fan-shaped before him, at the wicket, where two officials are seated in separate boxes. One takes the ticket, perforates it, and hands it back to the visitor, who gives it up to the official in the second box. Before ten in the morning and after six in the evening, two tickets are required. Having fairly entered the Exhibition, the visitor passes through the prettily laid-out gardens on the river side until he reaches the open space at the bottom of the Avenue Nicolas II., in which stand the two beautiful buildings, already referred to, devoted to the Fine Arts. Turning to the left, crossing the river by the new Alexander III. Bridge, the visitor has before him the buildings containing exhibits relating to national manufactures, furniture and decoration, and various industries. Taking first those on the left-hand side, and passing down the centre, he soon comes upon Class 75, in which will be found an assortment of lamps, chandeliers, and gas-fittings, a show of Welsbach burners, and several sizes of acetylene gas apparatus. Continuing to the end of the building, he should cross to those on the opposite side, and return to the foot of the new bridge. He can now walk through the Street of the Nations—one of the most attractive features of the Exhibition. It consists of a double row of pavilions constructed in a style characteristic of the nations to whom they severally belong. The pavilion built by the British Royal Commission, which was not formally inaugurated till last Thursday, stands between the Belgian and Hungarian Pavilions. It was designed by Mr. E. Lutyens to represent an old English manor house—in fact, the river front is a copy of Kingston House, Bradford-on-Avon—and was erected by Messrs. John Aird and Sons. The framework, constructed entirely of steel, was designed by Sir B. Baker.* Leaving this remarkable street, the visitor passes by a footbridge to the section of the Exhibition devoted to Hygiene and Arms. Just beyond the Mexican Pavilion will be found a building containing exhibits in Class 74—gas heating appliances—which, with its annex close by, will claim attention. Interest will doubtless be felt in the very fine show of implements of warfare made by Messrs. Vickers, Sons, and Maxim, in their pavilion, as well as by Belgium and other countries. Passing the conspicuous Creusot exhibit, the visitor very shortly reaches the Eiffel Tower, in the neighbourhood of which a pause may be made.

Continuing his walk, the visitor should enter the Palace of Mines and Metallurgy, where he will find much to engage his attention. A striking exhibit is an arch of castings from the Forges de Douai; another is the group of pipes sent by the Société Anonyme des Hauts Fourneaux et Fonderies of Pont-à-Mousson. There is a remarkable show of heavy and light castings here; and the group of courts down to the Swedish will bear careful examination. Just outside the building, as explained last week, stands the Gas Pavilion. After inspecting this, the Textile Fabrics, Clothing, &c., Section may be rapidly passed through, in order to reach the Mechanical Engineering Section, which comprises Class 20 (gas-engines). Motors by Niel, Charon, Brenhot, Delahaye, Ravel, the Duplex Company, Tangyes, and Crossleys are on view here—the exhibits of the last-named firms not being particularly well placed. A little farther on is the boiler-house, with its adjacent monumental chimney, 263 feet high. A similar chimney will be found on the other side of the building. While here, it will be well to look into the Festival Hall, having an area of 7560 square yards, and capable of holding 25,000 persons, in which the official inauguration of the Exhibition took place on the 14th ult. It is lighted by 4500 incandescent electric lamps. Neglecting the agricultural exhibits, and returning to the Machinery Section, the visitor enters the Palace of Electricity to which reference was made last week. Its aisles are 132 yards long and 44 yards wide, and they contain the machinery furnishing the electricity required for the Exhibition. The display of electrical appliances, when complete, will be something to make engineers open their eyes. Unfortunately, the arrangement of the exhibits was still in progress on the occasion of our visit; the gigantic crane of Carl Flohr, of Berlin, reaching

* Readers specially interested in this building will find a description of its contents in "The Times" of last Thursday.




A. Main Entrance. B. Entrance from the Champs Elysées. C. Fine Arts Palaces. D. Pont Alexandre III. E. Manufactures Furniture, Decoration, &c. (comprising Class 75). F. Street of Nations. F¹. Hygiene (comprising Class 74). G. Eiffel Tower. H. Mines and Metallurgy. I. Gas Pavilion. J. Porte Rapp Entrance. K, K¹. Electrical and other Machinery and Mechanical Appliances (comprising Classes 20 and 87). L. Areas lighted by the Paris Gas Company. L¹. Gas-compressing Station. M. Pont d'Iéna. N. Trocadéro. O. Old Paris. P. Paris Street. Q. Pavilion of the City of Paris. R. Pont des Invalides. S. Optical Palace. T. Celestial Globe. X. Exhibition Hotel. (The figures in the central portion of the plan—part of the city not comprised in the area of the Exhibition—show the points of access to the moving platform and the stations of the electrical railway; the latter being indicated by the encircled figures.)

to the roof of the building, being requisitioned for lowering into position a 25-ton armature at the stand of Siemens Bros., Limited. Germany, however, had a good show, and so had Switzerland. Leaving this important section of the Exhibition, and proceeding northward, the visitor passes on the left the building containing the exhibits connected with the chemical industries, and then comes upon Class 87—materials used in the manufacture of gas. A stand which cannot fail to attract notice is that of the Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz, of Paris. The collection comprises a Pelouze and Audouin condenser, photometers, an engine and exhauster, pressure registers, and a large meter. Proceeding farther on his way, the visitor reaches the Civil Engineering, Education, and Science and Arts Groups, in the last of which the Metropolitan Gas Referees show a pentance photometer, and Professor Thorpe, the Water Examiner to the Local Government Board, the apparatus used in the Government Laboratories, of which he is chief. The visitor now reaches the piano room, and passes out into the grounds near the south-west pillar of the Eiffel Tower. Ascending to the first stage of that ugly but highly remunerative structure, which is designated upon the official plan, for reasons into which we need not inquire, the "Tour de 300 Mètres," the visitor may pause again for rest and refreshment, and contemplate the remarkable scene lying below him on all sides.

Descending to *terra firma*, he might cast a glance at the buildings in the immediate vicinity of the Tower (including that containing the Worthington Company's exhibit), and then proceed on his journey. Crossing the Pont d'Iéna, he reaches the Trocadéro Palace, in the gardens of which have been erected the pavilions to contain the colonial exhibits. They cover an area of 40 acres. Immediately in front stands the Algerian Section, in which an attempt has been made to reproduce a street in Algiers. Here will be found, in a somewhat less obtrusive form, some of the features which proved so attractive in the Rue du Caire of the 1889 Exhibition. The Tunisian Section—with its interesting collection of mosques, shops, and cafés—is immediately adjacent. French colonies and the countries under the protection of France occupy the left-hand portion of this area; those of foreign countries the other side. There is much to tempt a visitor to linger here. Retracing his steps to the bank of the river, he turns to the left, and passing through the building containing the exhibits of the Chambers of Commerce, soon finds himself—that is, assuming he has paid his franc at the gate—in Paris of the Middle Ages! This highly interesting series of reproductions of historical buildings covers an area of 7200 square yards; its river front being 286 yards long. In passing through it, and rubbing shoulders with strange creatures, speaking "the French of Paris" of to-day, but clad in the garb and armed with the weapons of the sixteenth and seventeenth centuries, one's mind naturally reverts to the times depicted with such marvellous skill in the captivating romances of Dumas and Victor Hugo. But we must hasten on. Leaving Old Paris, and crossing the footbridge at the Pont de l'Alma, the visitor passes the Congress Hall, the Museum of Social Economy, and that truly extraordinary freak of fancy, "The Wonderful Tower"—in other words, the topsy-turvy tower—in which, by the use of reflectors, the visitor is made to believe he is walking on the ceiling. This forms a fitting introduction, from this end, to what may be called the frivolities of the Exhibition—the dancing and singing palaces, the theatre, aquarium, *tableaux vivants*, &c. They are all grouped together in the Rue de Paris; and they may be left severely alone or taken for just what they are worth, as the visitor feels disposed.

We are now drawing to the close of our long walk. Leaving the Rue de Paris, and the immense conservatory devoted to the horticultural exhibits, the visitor enters the pavilion of the City of Paris. This building stands parallel with the Seine; its *façade* being about 110 yards long, with a portion measuring 58 feet in length projecting about 9 feet towards the river. On the exterior are medallions showing the arms of the city since the year 1200. The structure is elegant and well lighted, and it contains exhibits relating to the general management and improvement of the city. Interesting to water engineers and those engaged in carrying out sewerage operations will be the plans of the sewage-disposal works, and the lengths of various-sized pipes

used in the supply of water, samples of which, drawn from the Varne, the Avre, the Ourcq, the Vanne, and the Seine, are shown in a large divided glass tank above and a stoneware one beneath. Some good draughtmanship is to be seen here. Taking the footbridge which passes over the Avenue d'Antin, and strolling through the gardens, the visitor comes to the larger of the two palaces devoted to the Fine Arts—the principal entrance to which is in the Avenue Nicolas II. The French works are on the right; the foreign ones on the left. On the opposite side of the avenue is the smaller palace, containing the retrospective collection of French objects of art. These two very fine structures are to be permanent. Returning into the avenue, we pass down it a short distance in the direction of the river, turn to the left, and reach the gate by which we entered, having completed the tour of the Exhibition. The distance covered, as the crow flies, without reckoning divergences, has been about five miles.

It will be obvious from what has been said that a one-day visit will only allow of a passing glance at the contents of the Exhibition. It will therefore be better to devote two days to it. This may be done by dividing the above itinerary in the middle—that is to say, at the entrance at the bottom of the Avenue Rapp—and taking the remainder on the following day. As an alternative, the first day's journey could commence at this point, and finish at the main entrance—thus comprising the machinery, the Colonial Sections, Old Paris, and the Fine Arts; and the second could begin at the Place de la Concorde and end at the Porte Rapp, or *vice versâ*.

Walking about the Exhibition is undoubtedly productive of fatigue. But there are fortunately three means by which the visitor can relieve himself of some of it. In the first place, he may, if so disposed, engage a *fauteuil roulant*—a wicker-work arm-chair in which he can be wheeled about just where he pleases at a cost of 2·60 frs. per hour. It may possibly be a little undignified for one of the male sex, who is not actually an invalid, to resort to the use of a kind of bath-chair; but the writer frankly acknowledges that he was glad on one occasion to avail himself of its assistance, and at the same time profit by the passing observations of its intelligent attendant. Next there is the electric railway, which takes the course shown on the plan. It is a single line, about 2½ miles long, and there are five stations upon it, their positions being indicated by the encircled figures. The trains, which consist of three covered carriages, accommodating about 200 passengers, run every 1½ minutes, their speed being about 10 miles an hour. The fare is only 25c. for any distance. The railway unquestionably facilitates rapid transition from one part of the Exhibition to another; and a fairly good view of the exteriors of the buildings may be obtained therefrom. Finally, we have a means of conveyance which is certainly unique, as far as the writer is aware, in connection with exhibitions—viz., the *plateforme mobile* or the *trottoir roulant* (for it is called by both names), a moving platform which follows the course of the electric railway, but in an opposite direction. There are nine points of access to the platform; their location being shown by the unenclosed figures. The fare is 50c. for any distance. From this elevated platform the visitor certainly obtains a better view of the Exhibition than he does from the railway; and seeing that, like the much-quoted Brook, it goes on "for ever"—or rather till seven or eight o'clock on week days and about half-past ten on Sundays—one could, if so inclined, spend a day upon it, if it were only furnished with a few garden seats. Though it is spoken of always in the singular number, there are, as a matter of fact, three platforms—one fixed and two moving, the latter being slightly higher than the other. The *trottoir* nearest the fixed platform, or quay, moves at the rate of 2½ miles an hour; the outer one going at just twice the speed. At short intervals there are fixed stout iron rods surmounted by knobs; and the would-be traveller simply takes hold of one of these, and steps on to the nearer platform, whence he passes to the farther one, and is conveyed round. The viaduct of the platform is supported by 268 timber piers about 20 feet high; and the weight of steel used in its construction was upwards of 1500 tons. As mentioned in our "Electric Lighting Memoranda" a fortnight ago, the platform is worked by electricity, the current being supplied by 17 cables; and 172 electric motors are employed. A few interruptions in the railway service have taken place; one, curiously enough, occurring simultaneously with a stoppage of the platform.

It will be convenient to give here a few particulars in regard to the lighting of the Exhibition which were inadvertently omitted from the article in the "JOURNAL" last week. It was stated, it may be remembered, that the gas lighting in the Parc du Champ de Mars had been carried out by the Paris Gas Company in conjunction with the Auer and Denayrouze Companies. It should have been mentioned that, for the ordinary incandescent gas-lighting in the vicinity of the Trocadéro, Denayrouze burners are employed; those used in the Champ de Mars being Bandsept "D" burners. Readers are probably aware that the electric lighting of the Exhibition has been relied upon to form one of its principal attractions. Preparations on a very large scale were made; but the scheme has not even yet, we believe, been carried out in its entirety. Some idea of its extent may be gathered from the following figures: In addition to the 5000 incandescent lamps in the Electricity Palace, to which reference was made last week, there are 1000 in the adjacent Château d'Eau, about a dozen arc and something like 3700 incandescent lamps at the principal entrance to the Exhibition, and 1068 of the latter lamps in each of the palaces on the Esplanade des Invalides, the central avenue of which is illuminated by 25 arc lamps, while 35 are used for what is called the "Quincunx" lighting. On the Alexander III. Bridge there are about 500 incandescent lamps. The grounds after dark will therefore, in time, present a brilliant spectacle. Good view-points for the two kinds of lighting are the north side of the above-named bridge, the Trocadéro Gardens, and the Eiffel Tower.

Since the foregoing was written, the programme for the forthcoming meeting of the Gas Institute has reached us. As it appears therefrom that the members visiting Paris who purpose returning on the evening of the 16th prox. will have only two mornings (Thursday and Saturday) free, the following suggestions are offered for utilizing the time at their disposal: On Thursday, enter the Exhibition by the gate just beyond the Celestial Globe, marked T on the plan. (It was near this globe that the collapse of the concrete bridge, referred to in a "Note" in the "JOURNAL" for the 15th inst., took place; and it is a conspicuous object from the Exhibition Hotel, where members will stay.) Look into the gas-compressing station of the Paris Gas Company, and then make for the Eiffel Tower. Enter the Palace of Arts and Sciences, and pass straight through to the Mechanical Appliances and Machinery Sections and the Palace of Electricity (K, K¹ on the plan). A *détour* may be made to the Swiss Village; but unless this has been connected with the Exhibition it will involve the use of a ticket for re-admission. Cross to the east side of the Machinery Section, ascend to the *plateforme mobile* at the point marked 1 (Salle des Fêtes Station), and go round to 4 (Pont des Invalides). Descend and walk through the Street of Nations, continuing past the Hygienic and Armaments Sections (getting a view of Old Paris, on the other side of the river, while doing so) to the Champ de Mars. This will probably occupy the morning till luncheon time. On Saturday, enter the Exhibition as before, cross the grounds under the Eiffel Tower, take the electric railway from station No. 4 (Parc du Champ de Mars) to No. 1 (Invalides-Université), visit the palaces on the Esplanade des Invalides, and return by rail or platform to the Champ de Mars. After luncheon, on the way to the Gas Pavilion, the Mines and Metallurgy Section, which is very interesting, may be taken. Should there be time after the inspection of the Pavilion, Old Paris and the Colonial Sections may be visited.

## THE PATH OF PATENT OFFICE REFORM.

THE efforts made from time to time in the "JOURNAL" with the object of guiding readers through some of the intricacies of Patent Law and Patent Office practice appear to be much appreciated; and we have the satisfaction of feeling that most of our views of debateable matters belonging to this category are fairly in agreement with the best contemporary expert opinion. For example, our protest against the hasty accusation of some popular writers on the subject that the Patent Office takes fees without giving value for the money, and against the principle of official examination of applications, is well supported by a skilled writer in the "Ironmonger," whose opinions of "Patents: British, German, and American," are given in a letter that appeared in our contemporary on the 5th inst. This is his point: That the English Patent Office does not really profess to issue a valid monopoly grant. All it does is to stamp and date a document which is supposed to have been properly drawn for use in bringing or defending a law suit; for the authority that actually confers the monopoly in this country is a judge of the High Court. There is reason to believe that this view of patent right is new to many an inventor; the general idea being rather that a patent is a valuable piece of property in itself. When this notion is rudely dispelled, as it usually is in various ways, the disillusioned patentee commonly turns round and abuses the Patent Office; whereas his own unfounded hopes and beliefs are really being visited upon him, according to the ruthless disciplinary system of the natural order of things sublunary.

It is further remarked, with much cogency, that where the English Patent Office is to blame, perhaps, is in not making the true nature of its grants plain and obvious to all and sundry. A patentee is allowed to parade his patent before the public, as if it constituted a valid legal monopoly, "the inventor being either ignorant and the public credulous, or the former 'bluffing' and the latter indifferent." This is a view of the facts which is so conspicuously true and instructive that one wonders it is so rarely mentioned in controversies on our patent system. It is to be feared, however, that in popular discussions of the case of the typical "poor inventor," as of so many other interesting hypothetical personages, it is far easier to go astray in pursuit of the abstract than to bear in mind concrete realities. The English Patent Office certainly ought to do this for the "poor inventor," and for the equally meritorious public, with whom he hopes to deal at an artificial advantage by virtue of his patent—it should proclaim on the face of the letters patent, and require the advertisement on the patented article, wherever possible, an English equivalent to the familiar French inscription "S.G.D.G." Doubtless these cabalistic-looking capitals have excited the wonder and exercised the speculative faculty of many English purchasers of French patented articles. They

mean, simply, that the patent right is without any Government guarantee—*Sans Garantie du Gouvernement*. They proclaim that the patent is issued "without prejudice," as the lawyers say; and that the letters patent are merely a sort of birth certificate, valid only so far as it goes.

With regard to the vexed question of whether a government office could or should "assist" the inventor and would-be patentee by subjecting his application to official examination, the anonymous, but evidently well-posted, critic whom we are now following admits that to the outsider, and to the inventor working in one of the less occult branches of creative industry, it very naturally seems desirable that the German and American official practice in this respect should be introduced into the English patent system. The theory of both the countries named in this connection is that their patents are only granted after the officials have satisfied themselves as to the novelty and patentability of the subject-matter of the application. The idea is perfectly good—in theory; but as it is actually worked, it is rendered perfectly worthless by the attendant disadvantages. Those who believe in the theory argue, of course, that, if the idea is good and likely to be beneficial to the inventor, and through him to the community, we ought not to be deterred from adopting it by the failures, probably preventible, of other countries to realize its advantages. The answer is that the practical disadvantages are inherent and incurable, while the benefits remain theoretical. It is clear, to begin with, that submission to official examination into originality and patentability can only be tolerable on the assumption that the examiners are infallible. This is with regard to examination with power of rejection. There can be no appeal; for the competency and fairness of the officials must not be questioned. As to the merely advisory examination, advocated by Mr. W. Lloyd Wise and others, we have, in a previous article, shown cause for objecting to it. Secondly, an authoritative official examination must be equally efficacious over the whole range of human endeavour brought within the cognizance of the Patent Office. To state this consideration is almost to answer it. There are degrees, in this as in other branches of knowledge. If a man is thinking of patenting a new brace button, or a new card game—and these are the "poor inventors" for whose benefit, in the popular mind, the Patent Offices of the world exist—there is comparatively little difficulty in the way of an official pronouncement as to the novelty of the invention. But suppose the case of a man who wishes to protect the method of producing a new coal-tar derivative. There are possibly not half-a-dozen other men living who know as much about it as he does himself; and these are all in the business, with him or against him. Such an expert would, and in some countries does, scorn the suggestion that the Patent Office Staff are able to pass any valid judgment upon his invention. Yet the officials are there, and what are they to do?

In addition to all other objections to official examination, there is the most serious one of the delay, which has nothing to do with the merits of the examination, as such. It was recently reported that an American patent of Edison's had just been sealed, about seventeen years after the date of application. And after all, there is as much litigation over German and American patents as over English ones—rivals in trade in these countries being just as willing to fight cases out in the Courts as they are here. All these considerations should make British inventors pause before they clamour for any substantial alteration of the English Patent Law to assimilate it to the German or American system in the matter of examinations. There may be, of course, points in the English system and practice which are capable of improvement; and the object, partly, of these studies of Patent Office systems is to bring out any such suggestions. Up to the present time, however, the case for fresh material alteration of the English law and practice is very weak. At one time, Mr. Lloyd Wise strongly favoured the suppression of the "provisional"—substituting therefor a complete specification, with extended facilities for amending the latter within the lifetime of the patent. There is a good deal to be said for the latter suggestion. We hold firmly the belief that the time is ripe for an independent inquiry into the operation of the English patent system, with particular regard to its influence upon the national industries. Much more good might be expected to come of such an investigation than of any agitation against the judicial hearing of patents. The enormous cost of patent actions is often urged as a reproach to the whole system; but it is not so. Patent litigation is not more costly than libel suits, and not nearly so expensive as actions to obtain possession of real estates which happen to be in other hands. People point to the heavy cyanide gold-extraction, or the incandescent gas-light litigation, and call it scandalous and ruinous. It never occurs to these critics that the Tichborne case bulked larger in all respects than any two or three patent law suits of the century; and that the issues here were in principle the same as those of patent cases—namely, who is the rightful owner of a particular piece of property. We shall never be able to limit the natural right of property to defend itself to the utmost of its resources, or of citizens who think they have a right to property not in their possession, to get it by all lawful means.

The reform of Patent systems and Patent Office practice is, however, a matter of practical politics, which must always be of engrossing interest to all those who have anything to do with industrial property. The questions mooted in our essays on the subject in the present volume of the "JOURNAL" indicate the nature and extent of the grounds upon which a new inquiry into the whole subject is called for. Mr. Levinstein, and those who are interested both generally and particularly in patents, licences, foreign competition with British patented specialities, and other aspects of the matter, should approach the Board of Trade and prevail upon the President of the Department to enlarge the inquiry which has been promised into one suggestion for reform, so as to embrace all that is actually debateable. It does not serve any real, fruitful purpose to go by popular opinion in matters of this kind. Yet, unless there is some sort of outside pressure brought to bear upon Ministers in a constitutional government, the Departments are slow to move. Mr. Ritchie told the cyclists the other day that their best remedy against the obstructiveness of the Railway Companies lay in their power as voters to influence parliamentary candidates. Inquiry into, and if requisite reform of, the Patent Law is equally one of those matters that may legitimately be brought under the intelligent notice of members and would-be members of the legislature, when opportunity serves. The "chestnuts" of the parliamentary platform are being dropped on all hands. It begins to look as if a more practical turn is being given to national politics than was possible in the fast-receding days when rhetoric was cultivated in the high places of the senate to the suppression of almost everything else. New causes of the minor order are wanted to go with the new Imperial statesmanship which seems at last to set deeds before words. Parliamentary candidates must listen when influential constituents speak; and if, at any rate in the big industrial centres, leading men suggest Patent systems as a fit subject of senatorial study, they will be heeded.

## THE CHEMISTRY OF TARS AND MINERAL OILS.

THE second volume of Mr. A. H. Allen's well-known work on "Commercial Organic Analysis" has long been a recognized authoritative book of reference in every laboratory where tars, tar-products, or mineral oils are dealt with. Unfortunately, for some time past the volume has been out of print, and it has now only re-appeared in two separate parts under new editorship, which is skilful but scarcely so successful as would probably have been revision executed wholly by the original author.* But as ill-health and multitudinous engagements have prevented Mr. Allen re-editing the work unaided, our best thanks are due to Dr. H. Leffmann for his co-operation, which was rendered doubly arduous by the paucity of opportunities which he had for consultation with his author and co-editor. Far better, however, is it that the volume should be obtainable in its present form than not at all, though we confess it does not attain to our ideal of a revised "Allen."

The information in regard to coal tar and its products is absolutely reliable; and the portions of the work which deal with petroleum and shale and their chief commercial products also are perfectly good. Russian petroleum, however, is perhaps scarcely given adequate treatment; and we find very scanty references to the "Solar" and similar distillates which are now so extensively used in the manufacture of oil gas and carburetted water gas. The chief properties of these gas oils should certainly have been described in a text-book of the scope of the one under notice. So far as any information in this work is concerned, the carburetted water gas industry might be virtually non-existent. Tars from sundry sources—some unimportant—are described; but the tar from carburetted water-gas installations is not even mentioned, though the quantity produced in America and Great Britain is now enormous. We should have expected to find full information on this tar in a work revised in the country where carburetted water gas has ousted coal gas from the predominant position. Yet to the best of our knowledge, we have still to go to English treatises on gas manufacture for such text-book information as is to be found on this interesting tar. Truly, it is in some places regarded as worthless; but in others, buyers of tar will pay as high a price for it as for coal tar. Mr. Allen's work should have indicated on what qualities the value of water-gas tar is determined. We have in this instance, we think, selected a typical case of the imperfection of the revision accorded to the book. Those to whom the earlier editions remain completely satisfactory will naturally be content with the present new edition, and will find the additional matter contained in it a welcome supplement to their previous store of data. But those who expect to find the third edition as up to date as the first and second were at the time of their issue will be very grievously disappointed.

Among the additions, we notice a rather scrappy account of acetylene, on which, we think, the information given has not been selected judiciously. The volume of research work on acetylene is now so enormous that only one who has made a special study of it is able to appreciate the relative technical importance

* "Commercial Organic Analysis." By Alfred H. Allen, F.I.C., F.C.S., Past-President of the Society of Public Analysts, Analyst for the West Riding of Yorkshire, the City of Sheffield, &c. Third edition, with revisions and additions by the author and Henry Leffmann, M.A., M.D., Professor of Chemistry and Toxicology in the Woman's Medical College of Pennsylvania, and in the Wagner Free Institute of Science, Philadelphia. Volume II.—Part II., Hydrocarbons, Petroleum and Coal-Tar Products, Asphalt, Phenols, and Creosotes. London, J. & A. Churchill; 1900.

of each contribution. We trust we are wrong in the impression which forces itself on us on reading the pages on acetylene in this edition of Allen, that the subject has been read up expressly by a busy contributor who had no previous knowledge of it. There is also much new matter on asphalt, disinfectants of the phenol class, and creosote. This appears to be quite good.

The introductory chapter, which deals with the classification of the hydrocarbons, is well compiled, and in most respects trustworthy. We see, however, that it is stated that gaseous olefines, as existing in coal gas, may be estimated from the diminution in volume of a sample of the gas when agitated with bromine. This statement is misleading; for bromine removes from the gas both the olefines and benzene and its homologues. It is true that bromine vapour re-acts very slowly indeed with benzene; but, nevertheless, benzene is completely removed from coal gas when the latter is agitated with bromine water. Probably this result is largely due to mechanical action; but it has been long familiar to gas chemists, who do not now return the hydrocarbons absorbed by bromine in their analyses as "olefines," but merely as "illuminating hydrocarbons," or "heavy hydrocarbons," or "illuminants," represented by the comprehensive formula $C_mH_n$. An analyst following the guidance of Messrs. Allen and Leffmann would have an error of over 25 per cent. in his estimation of olefines in coal gas. After the classification of the hydrocarbons, follow chapters on destructive distillation, tars, bitumens, and petroleum and shale products. Then come, in order, chapters on the important tar products, under the headings benzene and homologues, naphthalene and derivatives, anthracene and associates, and phenols. This list of the subjects of the chapters affords a fair conception of the scope of the volume, which, apart from the defects and limitations we have already indicated, should prove invaluable to the technical chemist.

## PERSONAL.

We are sure a large number of "JOURNAL" readers will join with us in offering congratulations to Mr. J. FERGUSON BELL, the Gas and Electrical Engineer of the Stafford Corporation, on the success which has attended his application for the position of Engineer and Manager of the Derby Gas Company, in succession to Mr. Charles Taylor, who, as already announced, will shortly retire. During the sixteen years Mr. Bell has been at Stafford, the gas-works have been almost entirely rebuilt and brought up to date, and the electricity works erected. The latter have been running for more than four years; and there has never been a single failure of the light. The price of gas has been reduced 10d. per 1000 cubic feet, meter-rents have been abolished, and this year there is a surplus profit of nearly 6d. per 1000 cubic feet after paying everything. The charge for gas ranges from 2s. 3d. to 2s. 9d.; and we understand that but for the enormous increase in the cost of coal, it would have been reduced to 2s. to 2s. 6d. net. In addition to holding the appointment at Stafford, Mr. Bell has done a fair share of consulting work for Gas Companies and Local Authorities in the Midlands. Before going to Stafford, Mr. Bell was Deputy-Manager at the Birkenhead Gas-Works. As our readers are aware, Mr. Bell is President of the Midland Association of Gas Managers, an ex-member of the Council of the Institution of Gas Engineers, an Associate Member of the Institution of Civil Engineers, and a Member of the Society of Chemical Industry. We believe Mr. Bell's appointment is a popular one with his professional brethren. The town in which his future work will be carried on is well supplied with gas by a private Company, who look after the interests of the consumers as well as those of the shareholders. The Board of Directors is composed of well-known business men of high standing; the Chairman being Mr. H. Swingler, D.L., who takes a great interest in the affairs of the Company. Mr. Bell will devote the whole of his time to his new duties.

## OBITUARY.

The death is announced, after a brief illness, of Mr. G. EARL, the Secretary of the Uckfield Gas Company. He was 62 years of age.

Mr. JOSEPH STANFORD, Chairman of the Edenbridge Gas Company, died on the 14th inst.—a few days after celebrating his 77th birthday.

Mr. CHARLES HOOKER, the Secretary of the Westerham Gas Company, died on the 15th inst., at the age of 64. The deceased had been in failing health for some time.

Among the honours which Her Majesty has been pleased to confer on the occasion of the anniversary of her birthday, is a peerage for Sir Richard Webster, on his elevation to the Bench as Master of the Rolls, in succession to Sir Nathaniel Lindley, and knighthoods for Alderman W. H. Stephenson, one of the Directors of the Newcastle and Gateshead Gas Company, and Mr. John Watney, the Chief Organizer of the City and Guilds of London Institute, and Clerk to the Mercers' Company; while Mr. A. Bonham Carter, the Referee of Private Bills of the House of Commons, and Professor T. E. Thorpe, the Director of the Government Laboratories, and Water Examiner for the Local Government Board, are appointed Companions of the Bath (Civil Division).

# NOTES.

### A Criterion for Pipe-Discharge Formulæ.

A somewhat mysterious article has appeared in the "Engineering Record" relating to the alleged discovery of a new criterion for determining the reliability of the results of experiments on the flow of water in pipes. It is further stated that this is a simple test which will probably indicate that some experiments long esteemed by engineers as reliable are really seriously wrong. Professor Gardner S. Williams has publicly defined the new criterion of the accuracy of experiments on pipe discharges as follows: "Assuming that the loss of head varies as the square of the velocity, the former must also vary as the first power of the velocity head. Wherefore, in any series of experiments covering more than one velocity, if the velocity heads and the corresponding losses of head be used as co-ordinates, theoretically, the points so located should fall in a straight line, which may be expected to pass through the origin, and the deviation of the points so plotted from such a line will indicate the relative merits of the several observations. It will be appreciated at once that, while some form of curve can usually be made to pass through and fit fairly well a great many observations, it is not such an easy matter to fit a straight line to them." It is stated that this test has been applied by Mr. G. H. Fenkell to most of the pipe-discharge experiments hitherto regarded as trustworthy, with the result of exhibiting a considerable number of them as hardly better than crude approximations. These results have not yet been published; and when they are, it is asserted that engineers will know more than they do at present about the flow of water in pipes. One of the great merits of the new test is said to be the readiness with which it lends itself to the detection, and to the qualification as plus or minus, of erroneous observations.

### The Action of Water on Asphalte.

The value of asphalte as a lining for water reservoirs has been recognized of late years; trouble which had arisen from leakage having been effectually removed by its use. It has been assumed that the material was unaffected by contact with water; but in a paper recently presented to the Engineers' Club of Brooklyn by Messrs. G. C. Whipple and D. D. Jackson, and published in "Engineering News," the results are given of a number of experiments which seem in certain cases to prove the contrary. The tests were conducted at the Mount Prospect Laboratory of the Brooklyn Water-Works, and covered a period of about two years. Seventeen specimens of asphalte were investigated, and both distilled and surface waters were used. Throughout the course of the trials it was observed that the waters which contained the smallest amount of mineral matter produced the greatest action upon the asphaltes. Sea water gave but little action; while the most marked effect was produced by distilled water. These facts show conclusively that the action of water upon asphalte is largely one of oxidation, and is due to the oxygen dissolved in the water. As a final test, however, a sample of Trinidad asphalte was covered with water which had been boiled until free from oxygen, and then tightly sealed to prevent absorption from the air. The action that took place under these conditions was very slight. It appears, therefore, that water acts chiefly as a carrier of oxygen, and does not to any extent give up the oxygen of its own composition. A practical example of the behaviour of asphalte in actual service as a reservoir lining is given in the case of the reservoirs at Denver (Col.), one of which was lined with Trinidad asphalte and another with California asphalte in 1891-2. The condition of both has become very unsatisfactory owing to the action of the water.

### Tough Coal Tar Paving.

The manufacture and laying of coal-tar macadam and tar paving for footpaths, yards, &c., has been greatly improved since the early days when it was first attempted to make pavements of this material. One of these pioneer tar pavings is now, it is reported, being broken up in a street in Brooklyn, New York, by the aid of a steam pile driver. The necessity of such treatment at least testifies to the structural soundness of the old paving. It appears that the original surface of this street was of the primeval "cobblestone" pavement finish, for which the old borough of Brooklyn was widely famed. The stones ranged in size from that of an apple to that of a pumpkin; and at some undated period the tortured people resolved to cover up the old stones with a smooth coating of tar asphalt. How many layers of the new material were laid is not recorded; but from 1868 onward successive coats were added, until the deposit attained a thickness of from 6 inches in the thinnest, to 14 inches in the deepest portions. The paving was never good, owing to the initial mistake of not removing the old cobblestones and grading the subsoil. The irregular thickness of the asphalt caused it to form ridges; and at last the cost of the incessant repairs led to the decision to remove it. This was more easily ordered than done. A steam macadam plough failed to tear up the tough asphalt; and, consequently, the contractor had recourse to a heavy guillotine chopper, worked by a pile driver. This cuts into the tar paving in lines, and hand bars do the rest. It is rather curious that such drastic measures should have been required to deal with the oldest tar paving in America; and the fact goes to show that the paving might have been good yet if the foundation had been satisfactory.

# TECHNICAL RECORD.

## THE INCORPORATED GAS INSTITUTE.

### The Programme for the Forthcoming Meeting—The Annual Report and Accounts.

We have received from the Secretary of the Gas Institute (Mr. Walter Dunn) the programme for the forthcoming annual meeting, which will be held at the Royal United Service Institution, Whitehall, on the 12th and 13th prox., under the presidency of Mr. E. Herbert Stevenson, M.Inst.C.E. The business on the first day will consist, as usual, of the presentation of the report and accounts (noticed below) and the premiums for papers read last year. The first (with the President's Medal) has been awarded to Mr. T. O. Paterson, for his paper on "Gas for Motor Purposes;" the second to Mr. T. Newbigging, for his paper on "Differential Rates;" and the third to Mr. John P. Leather, for his communication dealing with "Naphthalene Deposits." The President will then deliver his Inaugural Address; and immediately afterwards the following resolutions will be considered:—

(*a*) That it is desirable that the Incorporated Gas Institute and the Incorporated Institution of Gas Engineers be amalgamated.

(*b*) That it is desirable that such amalgamation be effected by the voluntary liquidation of the Incorporated Gas Institute and the Incorporated Institution of Gas Engineers, and by the transfer of all the property and assets of these two Societies to a new Society, to be registered under the 23rd section of the Companies Act, 1867, by the name of (incorporated 1900), having a Memorandum and Articles of Association in the form of the draft issued to the members, and produced to, and approved by, this meeting and identified by the signature of the President, subject to such alteration (if any) as may be approved by the Council.

If these should be approved, a resolution will forthwith be submitted to the members to sanction the voluntary winding up of the Institute. In the event of its being passed by the requisite majority, it will be submitted for confirmation as a special resolution to an extraordinary general meeting which will be subsequently convened. The reading and discussion of papers will next be taken; and the annual general meeting of the donors and subscribers to the Benevolent Fund will take place at the close of the morning sitting. The papers to be read are four in number, their titles being as follows: "Automatic Stoking and Inclined Retorts," by Mr. W. R. Chester, of Nottingham. "Roofs for Retort-Houses," by Mr. A. T. Walmisley, of London. "Some Disputed Points amongst Gas and Water Experts," by Mr. J. Wilkinson, of Drighlington. "Naphthalene, from the Retort to the Point of Deposition," by Mr. W. Young, of Peebles. In addition to the papers, a lecture will be delivered on the morning of the second day by Mr. W. H. Y. Webber, on "The New Gas." The rest of that day will be devoted to the technical matters not already disposed of, and to the transaction of the remaining routine business. In the evening, those of the members who have decided on joining the excursion to Paris will start *viâ* Dover and Calais or *viâ* Newhaven and Dieppe, according to their preference for the short or the long sea passage. On both sides of the Channel, carriages will be reserved for the party. On arriving in Paris, conveyances will be in readiness to take them to their destination—the Hôtel de l'Exposition, on the Quai de Grenelle, which is within a few minutes' walk of one of the entrances to the Exhibition (see map on p. 1431). The morning of Thursday has been considerately left open; but in the afternoon members have been invited by the authorities of the Paris Gas Company to visit one of their stations. Friday will be devoted to the sights of Paris—and a good day's work has been cut out. Saturday morning will be free; but after luncheon the party will assemble, in the Gas Pavilion in the Exhibition, on the invitation of M. Th. Vautier, the President of the International Gas Congress, and, under the guidance of the Committee, will inspect the exhibits relating to gas manufacture, distribution, &c., which will be found there. Some particulars in regard to them were given in the "JOURNAL" last week, p. 1356. After dinner, those of the members whose visit is to be short will leave for London, where they will arrive early on Sunday morning. Arrangements can, however, be made for prolonging their stay at the hotel (which is stated to contain 1000 beds), should they be desirous of doing so.

The report of the Council shows that the total number of members on the roll at the end of last year was 682, distributed as follows: Honorary, 19; ordinary, 518; extraordinary, 32; associate, 57; associates, 56—an increase of 18 on the year 1898. The ballot at the last annual general meeting resulted in the election of thirty members and eight associate members; and two of the latter class were also transferred to that of member. On the other hand, there were nine resignations and removals of names; and the Council record with sorrow the loss by death of fourteen members, whose names are given. Three—MM. Breittmayer, Jordan, and Melon—were honorary members; and two others were Mr. Peter Simpson, of Rugby, who had been one of the Trustees of the Institute since 1889, and Mr. Frederick G. Burfield, who was Secretary from 1893 to 1896. The Council review the proceedings at last year's meeting, a "notable incident" of which, they point out, was the appearance thereat of Mr. George Livesey, Mr. George Bray, and Mr. Charles Sellers, each of whom, at the request of the President (Mr. Samuel Stewart), addressed the members. The Council report on this matter as follows: "Endorsing the cogent observations made by Mr. Stewart in his Presidential Address, they spoke on the very great desirability of establishing a united Association, and expressed the earnest hope that the amalgamation of the two Societies involved might soon be effected. Their remarks were received with hearty approbation. The Council of the Institution of Gas Engineers subsequently communicated with the Council of the Gas Institute on the matter, and a Joint Committee of both Societies was appointed to consider negotiations. Their recommendations have been carefully discussed by the respective Councils, and have been adopted, with modifications." The Council inform the members that they have accepted an invitation from the Committee of the Société Technique du Gaz en France for the Institute to participate in the International Gas Congress to be held in Paris next September. The French Society make reference to pleasant remembrances of the reception extended by the Institute to them on the occasion of their visit to London in 1888, and promise a cordial welcome to those attending the congress from this side of the Channel. The accounts accompanying the report show a balance of £252 carried to the profit and loss account; bringing up the total to £1509.

## MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

The remembrance of the pleasant excursion the members of the Institution had to Kendal twelve months ago, was evidently responsible for the large attendance at Saturday's gathering, which had been arranged for the Lake District during the presidency of Mr. T. N. Ritson; and the weather being all that could be desired for outdoor enjoyment, many were the congratulations the Secretary (Mr. S. S. Mellor) received on the success attending the day's proceedings. An early start from Manchester enabled Kendal to be reached by train shortly after mid-day, when the party drove in coaches to the Commercial Hotel for lunch.

Before separating, the only formal business of the day was transacted—the confirmation of the minutes of the last meeting, at which Mr. Ritson delivered his Presidential Address, and the election of the following three new members: Mr. H. Barker, of Buxton; Mr. J. H. Buckley, of Formby; and Mr. W. L. Donaldson, of Lymm.

A drive through the lovely country lying between Kendal and Bowness, on Lake Windermere, was the feature of the day; and the lake was reached in time for the members to enjoy a stroll of an hour and more before tea was served at the Royal Hotel. Afterwards the coaches were again requisitioned for a drive to Windermere; and the bulk of the members returned to Manchester by train, reaching the city about half-past nine.

Much interest was evinced in the presence among the party of Mr. J. W. Carr, who has just been relieved of his charge as Engineer and Manager of the Johannesburg Gas-Works. Mr. Carr was ordered by the Transvaal Government to leave Johannesburg at forty-eight hours' notice, and returned to England last Saturday week. As may be imagined, he was heartily received by the members present, and vastly interested many in the course of the day with his personal experiences in South Africa.

## MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.

On the occasion of the Monthly Meeting of the above-named Association last Saturday, the members paid a visit to the works of the National Gas-Engine Company at Ashton-under-Lyne. The party numbered about thirty. On reaching the works, they were received, in the absence of the Manager, by Mr. Wood and Mr. Addenbrook, who gave them a hearty welcome. These gentlemen then conducted the party through the various departments, including the foundry, the fitting and erection shop, and the machine-shops, which were most ably and fully explained by Mr. Wood. Then they had the pleasure of seeing at work two very large gas-engines used for the electric lighting of the premises. Every part of the engines was dealt with; and what had previously been somewhat of a mystery to the members was made clear by the explanations furnished. After having gone through all the departments, the party retired to the office, where Mr. R. H. Garlick, the President, moved their best thanks to Mr. Wood and Mr. Addenbrook for the pleasant way in which they had received the Association as well as for the lucid manner in which the works and plant had been described—nothing having been kept secret. Mr. Butterworth, in seconding the motion, also made a few complimentary remarks; and the resolution was carried. Mr. Wood responded, and thanked the members. The party then left, after spending a most enjoyable, useful, and instructive afternoon. After the visit, they made their way to Stamford Park, where tea was provided. A short meeting was afterwards held; the remainder of the evening being devoted to games.

Paraffin is the staple source of artificial light in Palestine; neither coal gas nor electricity having as yet been introduced for illuminating purposes. Coal is almost entirely used on the railway, and in some of the flour-mills erected at Jaffa and in the neighbourhood.

## THE INCANDESCENT GAS-MANTLE AND ITS USE.

By VIVIAN B. LEWES, F.I.C., F.C.S.,

Chief Superintending Gas Examiner to the Corporation of London, Professor of Chemistry at the Royal Naval College, Greenwich.

**[The Last of a Course of Three Cantor Lectures at the Society of Arts delivered May 14, 1900.]**

The history of the incandescent mantle has not been altogether devoid of attempts to introduce forms suitable for flames other than those given by the bunsen burning from a circular tube. First and foremost among these in the inception of incandescence came the Fahnehjelm comb, made of a number of thin magnesia rods set in a back of fire-clay, supported by an iron frame clamped above a small Bray burner in which water gas was consumed. The comb, however, as has been before stated, burnt away in less than 100 hours, owing to the volatility of the magnesia; while the light which it emitted, even in its prime, only amounted to 3 or 4 candles per cubic foot. It was, however, afterwards found that dipping it in a solution of chromic acid brought this up to nearly double this value, and increased its life fourfold.

When the idea of making a fabric was firmly established, and the mantles began to be a success, De Mare tried to utilize the flat flame as a source of heat in which to excite a fringe of fabric soaked in a mixture of the salts of the rare earths, and burnt off so as to give a comb of very fine oxide filaments; and the effect produced by this, when properly arranged, was extremely good. In the burner employed for this purpose, he first tried what was practically a flat-flame bunsen, which gave very good results; and later he employed a burner in which the coal gas *per se* was forced out into the air in so thin a sheet that the hydrocarbons in it became thoroughly consumed, and a non-luminous flame was produced. It was possible to do this in Paris, as the gas supplied was only 14 candles, and the pressure at which it was distributed 4 to 5 inches; so that, by using a very small Bray nipple, a thin non-luminous flame is produced, which, owing to the admixture of air being only just sufficient to give the desired effect, was hotter than the flat bunsen flame. It was attempted to introduce these De Mare plumes into England; but the rare earths employed were held to be the equivalent of the earths protected in Welsbach's 1885 patent.

Another very effective variety of incandescent is to be found in the De Lery burner and its cluster of baby mantles or tassels. Taking a bunsen burner with a dome top, in the sides of which holes were pierced at regular intervals, De Lery obtained a circle of small bunsen jets, each of which raised to incandescence a small tassel of the oxides of thorium and cerium, which were suspended from a twelve armed circular support, and hung in the corresponding number of flames issuing from the top of the burner. The effect given is most excellent, as spreading the incandescence over a considerably larger surface prevents the irritation of the eye so prevalent with the ordinary mantle; while the diffusion of light obtained in the room is distinctly superior to that furnished by the ordinary mantle.

I have already, on more than one occasion, pointed out the great difference which exists between the measurement of illuminating power as carried out on the photometer and the illuminating effect which one obtains from illuminants in practice; and the De Lery tassel burner is as good an example of this phenomenon as can be found. Although it gives less light than the ordinary incandescent mantle when tested at the horizontal in the photometer, its illuminating effect is far superior to it; and the light, being mostly cast in a downward direction, illuminates the surface below the burner, while with the ordinary mantle, the bulk of the illumination is thrown from the horizontal upwards, owing to the form of mantle being a cone. These burners with their tassels have proved very successful in America; and I am informed that they will shortly be introduced into this country, when their novelty of appearance and excellent effect will undoubtedly go a long way towards achieving success.

Attempts have also been made to strengthen and increase the amount of light obtainable from the ordinary shape of mantle, a noticeable endeavour in this direction having been made by Plaissetty, who, observing the great intensity of heat produced over the small area immediately above the burner top, and the tendency which mantles had to shrink at this spot, attempted to both strengthen the mantle and increase its light-emissivity by braiding the mantle with clocks or seams of the same incandescent material as that of which the mantle was composed. The result, however, did not give promise of any very great increase in illuminating power; and it has been, I believe, abandoned. Plaissetty also made mantles consisting of plaited bands or ropes, each perfectly distinct from the other, which were hung from a central support around the mantle head, and which could be burnt off by the consumer, as no shaping was required.

Leaving, now, the subject of the mantle which is heated to incandescence, let us pass on to the burners, which have from time to time been improved and altered in order to give the highest attainable candle power from the incandescent mantle. It was Davy who first showed that, when a jet of coal gas is allowed to pass under pressure from a small orifice and is then burnt upon the surface of a piece of wire gauze held an inch or two above the exit pipe, the flame, being kept from flashing-back to the exit owing to the high conducting power of the gauze, becomes non-luminous. This result he correctly ascribed to the gas mingling with the air in its upward passage, and, as he supposed, completing the combustion of the carbon so rapidly as to prevent the presence of any solid particles that could be heated to incandescence. The concreting of this idea into the burner that has done so much for the utilization of gas as a fuel and an illuminant, is due, as I have shown, to Roscoe and Bunsen; and simple as the adaptation was, it forms a link in the chain that supports the great gas industry, even more important than Welsbach's valuable discovery.

In the early form of burner made by Bunsen, the gas issued from either a flat flame or an argand burner head into a metal cylinder, open at the bottom, and closed at the top by means of a disc of fine wire gauze; so that the gas issuing from the burner head passed upwards through the air in the cylinder, mixed with it, and the mixture burnt on the top of the gauze. The difference between this class of burner and those which succeeded it was that the uprush of the gas, and its mingling with the air, was due simply to the velocity with which it left the burner and the specific gravity being less than half that of air.

Very soon, however, it was found that a more rigid flame, and one more easily under control, could be obtained by utilizing the pressure under which the gas was delivered at the burner to act as an injector; and instead of merely mingling with air in its upward flow through a surplus, to make the uprush of the gas drag in air through side holes arranged at the bottom of a vertical burner tube placed above the gas-nozzle. In order to do this, a small jet, or series of orifices, discharged the coal gas into a small chamber surmounted by the upright burner tube; and either the walls of the chamber or the lower portion of the tube were perforated with an opening or openings in connection with the air. On opening the gas-tap, the coal gas is discharged through a jet with a velocity dependent upon the pressure of the supply, and, rushing upwards and impinging upon the sides of the tube above, acts in the same way as the steam in a Giffard's injector, and, by drawing up from the chamber the air which is present there, forms in it an area of low pressure, and so sucks in more air through the lateral holes to re-establish equilibrium —this action continuing, and the formation of the mixture of gas and air in the tube going on, as long as gas continues to flow.

By adopting this arrangement, it is manifest that, by regulating the size of the hole in the gas jet and the lateral air holes, it is possible to adjust the mixture of air and gas formed in the tube with the greatest nicety, and to obtain a perfectly non-luminous and fairly rigid flame at the top of the burner. After burners have, however, been in use for some time, no matter how well they may be regulated at first, the partial stoppage of the injector tip, by dust particles and other causes acting upon the jet and air supply, frequently deranges the ratio of the two supplies; and the result is that, in a laboratory or other place where a large number of bunsen burners are used, a wide discrepancy can be noticed in the appearance of the flames given by the burners. In some, the gas is burning with a slightly luminous top and the inner zone is barely visible. In others, the normal conditions exist, and you have a well marked violet inner zone and a non-luminous lilac outer zone. In others, again, the flame is somewhat shortened, showing a distinct greenish tint in the inner zone, with a pale lilac outer zone; and it is generally found that, when this point has been reached, the flame has more or less a tendency to roar, and will frequently flash back in the burner-tube and ignite the gas as it issues from the jet.

These appearances all mark different ratios between the air and gas in the mixture passing up the tube. When one sees a slightly luminous tip, it means that the gas is mixed with less than twice its own volume of air; while, with the normal conditions obtained with ordinary 16-candle gas (one volume of gas drawing in 2·2 volumes of air), the violet inner zone begins to show a tendency to turn to green when the ratio has become 1 of gas to 2·3 of air. Another $\frac{1}{10}$ per cent. causes the green to become most marked, and the roaring to commence.

With the ordinary bunsen burner as used in the laboratory, it is not possible to push the admixture of air and gas beyond this point, as the admixture of air and gas in the tube is now explosive, and the flame is only prevented from flashing back to the jet below by the rate of propagation of the explosive wave being less than the upward rate of flow of the mixture. Any further increase in the quantity of air present increases the rate of the explosive wave, and so causes flashing back. If, however, the head of the burner tube be covered with a layer or layers of fine wire gauze, the power of conduction which the fine metal filaments possess, and the fact that they reduce slightly the area of the tube and so increase the rate of flow through the orifices of the mesh, prevent the downward propagation of the wave. Under these conditions, the ratio of air to gas can be raised to over 3 volumes of air to the 1 volume of gas; and the green zone shrinks down on to the surface of the gauze, and shows itself as a seething layer in which the green colour has reverted to a very pale blue.

The importance of the regulation of the ratio between the gases having been recognized, the air holes in most of the burners used for laboratory and heating purposes were then fitted with cut-off rings, consisting of a loose ring of metal with holes in it, which could be slid round over the holes in the side of the chamber; so that when the two sets of holes coincided, the full air supply could be obtained. By drawing the solid metal of the ring more or less over the under holes, the area of

the air supply could be reduced; and in this way it was possible to adjust the condition of the flame to the work required of it. It will be evident that it is the admixture of air with the coal gas before combustion that causes the production of a non-luminous flame; and the old theory to account for this phenomenon was that the oxygen burnt up the hydrocarbons in the gas before their decomposition set free any solid particles of carbon to render the flame luminous. Knapp and others, however, showed that oxygen was not necessary for the production of a non-luminous flame, but that the luminosity could be destroyed by diluting the gas before combustion by such non-inflammable and inert gases as nitrogen, carbon dioxide, and steam; and the experiments of Blochmann, Landolt, and Heumann showed that nitrogen played a most important part in the action.

Some years ago, I attempted to ascertain the relative importance of the oxygen and nitrogen in rendering the flame non-luminous; and for this purpose I employed a bunsen burner, fitted at the bottom of the tube with two supply pipes instead of the ordinary gas-jet and lateral air holes. Each pipe was connected with a small meter, so that the flow of gas and air could be measured. The first determination was the quantity of air that was necessary to render the flame non-luminous; and it was found to require 13·5 volumes of air for 6 volumes of gas (13·5 volumes of air contain, roughly, 2·7 of oxygen and 10·8 of nitrogen). When 6 volumes of coal gas were passed into the burner with 10·8 volumes of nitrogen, a flame was obtained which had only a slightly luminous tip; while with 2·7 volumes of oxygen to the 6 volumes of coal gas, a luminous flame was obtained which flashed-back unless the burner was provided with a gauze top.

A bunsen burner burning coal gas alone gave on the photometer, with 5 cubic feet per hour, 5·6 candles; but with the addition of 2·2 cubic feet of oxygen, 3·1 candles. Using nitrogen, however, in the proportion of 9 cubic feet to 5 cubic feet of gas, the luminosity was so feeble that it could not be read. It follows, therefore, that the amount of oxygen in the air necessary to destroy the luminosity does less than one-half the work; and, accordingly, another experiment was tried with varying amounts of oxygen, the results being as follows:—

| | Candle Power. | |
|---|---|---|
| 5 cubic feet of gas alone . . . . . | 5·6 | |
| 5 ,, ,, to 1·1 cubic feet of oxygen | 5·4 | |
| 5 ,, ,, ,, 1·5 ,, ,, ,, | 8·0 | |
| 5 ,, ,, ,, 2·2 ,, ,, ,, | 3·1 | gauze used |
| 5 ,, ,, ,, 2·5 ,, ,, ,, | 0·0 | ,, |

The next determination to be made was the amount of nitrogen that was needed in order to bring about complete non-luminosity by dilution only. Nitrogen was supplied to a coal-gas flame burning at the rate of 6·2 cubic feet per hour; and it was found that 14·2 cubic feet per hour of nitrogen were needed to effect this result—an amount which is practically the same as that of the air required before.

1 volume of gas required 2·30 volumes of nitrogen.
1 ,, ,, ,, 2·27 ,, ,, air

This seems to show that the oxygen acts merely as a diluent; but if this were so, the mixtures of oxygen and nitrogen containing a larger percentage of oxygen than ordinary air should have the same effect on the luminosity of the flame as air. This, however, is disproved by the following results:—

*Volumes of Varying Mixtures of Oxygen and Nitrogen Required to Render 1 Volume of Coal Gas Non-Luminous in a Bunsen Burner.*

| Gas. | Volume of Mixture Required. | Composition of Mixture. Nitrogen. | Oxygen. | Volume of Oxygen Present in Amount Required. |
|---|---|---|---|---|
| 1 volume .. | 2·30 .. | 1 .. | nil .. | nil |
| 1 ,, .. | 2·30 .. | 5 .. | 1 .. | 0·38 |
| 1 ,, .. | 2·27 .. | 4 .. | 1 .. | 0·45 |
| 1 ,, .. | 2·02 .. | 3 .. | 1 .. | 0·50 |
| 1 ,, .. | 1·49 .. | 2 .. | 1 .. | 0·50 |
| 1 ,, .. | 1·00 .. | 1 .. | 1 .. | 0·50 |
| 1 ,, .. | 0·50 .. | nil .. | 1 .. | 0·50 |

From this, it will be seen that, until the percentage of oxygen reaches the amount present in air, the diluting influence of the nitrogen overpowers the effect of the oxygen in the destruction of the luminosity; but with 25 per cent. and over of oxygen, the retarding influence of the nitrogen has no effect on the activity of the oxygen,

The effect of various gases in bringing about non-luminosity was then tried; but the employment of a wet meter for measuring purposes rendered the number of these limited.

*Volume of Gases Required to Render 1 Volume of Coal Gas Non-Luminous.*

| | | | |
|---|---|---|---|
| 1 volume of coal gas requires | 0·50 | volumes of | oxygen |
| ,, ,, ,, ,, | 1·26 | ,, | carbon dioxide |
| ,, ,, ,, ,, | 2·27 | ,, | air |
| ,, ,, ,, ,, | 2·30 | ,, | nitrogen |
| ,, ,, ,, ,, | 5·11 | ,, | carbon monoxide |
| ,, ,, ,, ,, | 12·40 | ,, | hydrogen |

So that a combustible diluent which increases the temperature of the flame is required in far larger quantity than a non-combustible diluent, in order to render the flame non-luminous.

The varying effects of diluents have been attributed to the influence of density; but it has been shown by Heumann that a flame can be rendered non-luminous by cooling as well as by dilution. If a luminous flame be caused to spread itself over a cold surface, it became non-luminous; but the luminosity could be restored by heating the surface over which the flame plays. If, therefore, a diluent had the power of extracting more heat from a flame than another, it would be more active in reducing the luminosity, so that a smaller quantity would be required to render the flame non-luminous; and on comparing the specific heats of the gases used in the last experiment, the reason for the small quantity of carbon dioxide is at once seen.

*Specific Heats of Equal Volumes.*

| | |
|---|---|
| Oxygen . . . . . | 0·2405 |
| Carbon dioxide . . . . . | 0·3307 |
| Nitrogen . . . . . | 0·2370 |
| Air . . . . . | 0·2374 |
| Carbon monoxide. . . . . | 0·2370 |
| Hydrogen . . . . . | 0·2359 |

Experiments show that this is in all probability the true explanation, as in the flames rendered non-luminous by diluents the inner cone for the first 1½ inches is decidedly cooler than in the luminous flame, owing to the cooling action of the nitrogen or carbon dioxide. Above this point, however, the influence of the oxygen begins to be felt, and the non-luminous flame is here hotter than the luminous flame; while the hottest portion of the flame is to be found half way between the tip of the inner and outer cones. With inert diluents, however, the hottest points are found at the side and tip of the outer cone when the air necessary for combustion is obtained.

With a bunsen burner, in which the mixed gas and air give a green inner cone, although a low temperature is found at the bottom of the inner cone, due to the excess of air, yet the increased quantity of oxygen causes a rapid oxidation in the upper portion, and a smaller and hotter flame is produced. From these experiments, and also from the researches made by Heumann, it will be seen that several causes aid in the destruction of luminosity in a flame, chief among which are oxidation, dilution, and cooling.

The chemical changes taking place in a bunsen flame are far more simple than those which are going on in the luminous flame. Taking ordinary London gas having the composition—

| | |
|---|---|
| Hydrogen . . . . . | 52·16 |
| Unsaturated hydrocarbons . . . . . | 3·50 |
| Saturated hydrocarbons . . . . . | 36·25 |
| Carbon monoxide . . . . . | 3·68 |
| Carbon dioxide . . . . . | 0·00 |
| Nitrogen . . . . . | 4·10 |
| Oxygen . . . . . | 0·31 |
| Sulphuretted hydrogen . . . . . | 0·00 |
| | 100·00 |

A gas of this composition would require about 5 times its own volume of air for its complete combustion. When a bunsen burner burns with a blue non-luminous flame, the ratio of gas to air is about 2 to 1—less than half the amount necessary for complete combustion; while with the green inner cone, 2·5 of air mix with 1 of gas. So that the bunsen flame obtains from the mixture only about one-half the air necessary for its complete combustion, the remaining portion being obtained from the exterior of the flame during combustion. This is the cause of the double cone in the flame; the inner cone being formed by the incomplete combustion of the gas with the admixed air, and the outer cone by the combustion of the products of this incomplete combustion by means of the external air. This can be proved by the use of an apparatus devised by Mr. Lewis T. Wright, and perfected by Professor Smithells, in which the two parts of the flame can be separated. This dual action is practically complete when the ratio of air to gas is 2·6 to 1, and the green cone is produced. The action of the mixture in the inner cone may be approximately expressed by the following equations:—

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Hydrogen | | Oxygen | | Water | | | |
| | $H_2$ | + | $O$ | = | $H_2O$ | | | |
| Ethylene | Oxygen | | Carbon monoxide | | Water | | Hydrogen | |
| $C_2H_4$ | + $O_2$ | = | $2\,CO$ | + | $H_2O$ | + | $H_2$ | |
| Methane | Oxygen | | Carbon monoxide | | Water | | Hydrogen | |
| $CH_4$ | + $O_2$ | = | $CO$ | + | $H_2O$ | + | $H_2$ | |

And the resulting carbon monoxide and hydrogen, in about equal proportions, diluted with twice the quantity of steam, and the unchanged nitrogen, burn at the expense of the oxygen of the external air forming the outer cone. A small quantity of carbon dioxide is also always found, probably due to the oxidation of some of the carbon monoxide by the steam; and the gaseous mixture which forms the outer cone has an approximate composition of—

| | |
|---|---|
| Water vapour. . . . . | 16 per cent. |
| Nitrogen . . . . . | 60 ,, |
| Carbon monoxide . . . . . | 9 ,, |
| Hydrogen . . . . . | 10 ,, |
| Carbon dioxide . . . . . | 5 ,, |
| | 100 |

It does not seem possible that such a mixture, containing as it does less than 20 per cent. of combustible gas, should burn and produce the intense heat found in the outer cone of the bunsen burner; but Professor Smithells has shown that, under ordinary conditions, the heat of the inner cone is added to that of the outer. So that in the combustion the outer cone is always hotter than the inner. That this is so, can be clearly shown by using the Smithells tube, and, having widely separated

the two cones of the flame, holding a mantle in the outer zone, which fails to heat it to incandescence. But on now allowing the inner cone to rise in the tube, the mantle becomes more and more luminous, until the cone has resumed its proper position in the centre of the flame, when the mantle gives its full incandescence.

It is quite clear that the ratio of gas to air needed to give the best results in a bunsen burner intended for use with an incandescent mantle must be the one which yields the hottest outer zone to the flame; and it might be expected that this would be arrived at by only just allowing sufficient air to mingle with the gas to render it non-luminous, as there then being a larger proportion of combustible gas to burn at the surface of the mantle, one might expect a higher temperature at that point. This, however, is not the case, as the heat from the combustion in the inner zone can only escape through the outer zone; and the maximum effect on the mantle is produced when as nearly as possible one-half the combustion takes place in the inner zone, at the expense of the air drawn in with the gas through the air holes of the bunsen, while the second half is burnt on the surface of the mantle itself.

This was proved experimentally by closing the air holes and removing the injector from a mantle burner, and fitting in its place a T piece, through the arms of which the gas and air measured by the standard meters were passed. The gas supply was kept constant at 5 cubic feet per hour at a pressure of 1·5 inches of water, and the air regulated to give the desired appearance to the flame. The rate of flow of gas and air was then taken, and a well fitting mantle placed on the flame, the illuminating power ascertained, and a Le Chatelier thermo-couple placed so that the twist just touched the mantle at a point 1 inch above the burner head. Every precaution was taken to ensure accuracy; and the results were as follows:—

| Condition of Flame. | Ratio of Flow. Gas. | Air. | Ratio. Gas. | Air. | Candle Power per Cubic Foot of Gas. | Temperature. °C. |
|---|---|---|---|---|---|---|
| Under aerated | 4·5 | 10·00 | 1 | 2·20 | 14·4 | 1880 |
| Best aeration | 4·5 | 12·75 | 1 | 2·75 | 20·0 | 1915 |
| Over aeration | 4·5 | 15·25 | 1 | 3·40 | 17·7 | 1905 |

On analysis, the gas was found to contain:

| | |
|---|---|
| Hydrogen | 60·4 |
| Saturated hydrocarbons | 28·1 |
| Unsaturated hydrocarbons | 4·0 |
| Carbon monoxide | 5·0 |
| Carbon dioxide | 0·0 |
| Oxygen | 0·5 |
| Nitrogen | 2·0 |
| | 100·0 |

And, by exploding with oxygen, it was found that, for its complete combustion, 1 volume of gas required 5·5 volumes of air. From these experiments, it is clear that there is a point in the aeration of the bunsen flame which gives the highest temperature in the portion where the mantle is situated, and that above or below this ratio the light yielded by the mantle suffers.

Experiments were then made to determine the effect upon the light emitted by the mantle of different degrees of aeration; the arrangement of the apparatus being such that the burner could suck in the air it needed in the usual way from a bulb—the gas being burnt at a constant rate under a pressure of 1·5 inches of water, while the flow of air could be varied. On plotting out the results of the experiment as a curve in which the upright shows the candle power, and the lower side the ratio of volume of air to 1 volume of coal gas, the result shows that, with a 16-candle gas, on increasing the aeration the candle power of the mantle steadily rises until a maximum is attained with a mixture of 1 of gas to 2·5 of air, or just about one-half the amount of air required for complete combustion. On increasing the aeration above this point, the candle power fell steadily.

A serious trouble with mantle lighting is the carbonization of the mantle, which commences with a slight sooty deposit at one spot, and which then rapidly grows over the surface of the mantle, not only reducing the light emitted, but giving rise to traces of carbon monoxide in the products of combustion. When the flame is under aerated, and contains a ratio of less than 2·2 volumes of air to 1 of gas, some methane escapes combustion in the inner zone of the flame and burns with the carbon monoxide and hydrogen in the outer flame; and it is this which causes the trouble.

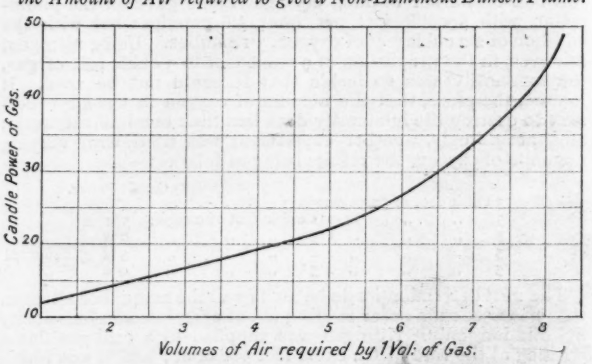
On replacing the ordinary tube of a bunsen burner with one made of platinum, and if the ratio of gas and air be so arranged as to give a blue non-luminous flame, on heating the platinum tube the flame becomes luminous, although not to such an extent as would have been obtained from the original gas. If the tube be allowed to cool down, the flame again becomes non-luminous, showing that the luminosity is solely due to the restoration of heat to the flame, and not to any alteration in the composition of the gas. But with a bunsen burning with a green inner cone, luminosity cannot be produced by heating the mixture of gas and air. On now taking an ordinary bunsen with a brass tube, and surrounding the blue non-luminous flame with a platinum gauze mantle open at the top, so arranged that the sides of the flame heat the mantle to a high temperature, the top of the flame will become luminous, owing to the platinum superheating the flame gases from inner cone and causing them to decompose with separation of carbon particles. The same result is obtained with an ordinary mantle open at the top; and it is to this cause that the deposition of carbon on the mantles is due.

It will often be found that the carbon begins to deposit on the rod which supports the mantle, and which is fixed in a small plate in the burner head. Above this plate, there is a zone of unburnt gas which is raised to a high temperature by the radiant heat from the walls of the mantle; and the same conditions as before for the deposition of carbon are brought about. When once this carbon has started to form, its catalytic action causes the decomposition of the hydrocarbons still present to proceed with greater rapidity; so that, in time, both the upper part of the rod and the mantle become so crusted with carbon as not only to reduce the light emitted to a minimum, but to cause the formation of distinct quantities of carbon monoxide in the products of combustion.

The amount of air needed to give a non-luminous bunsen flame varies with the richness in hydrocarbons of the gas; and the higher the candle power, the greater must be the volume of air used for each volume of gas.

It is found by experiment that, although the increment in the volume of air needed for each extra candle power in the value of the gas is fairly constant for gases below 20-candle power, it rapidly rises when richer gases are used; and the following curve (in which the figures in the side represent the candle power of the gas, and the figures on the bottom line the ratio of air to 1 volume of gas) shows the amount needed by gas of from 16 to 50 candle power.

DIAGRAM *showing the Influence of the Candle Power of the Gas on the Amount of Air required to give a Non-Luminous Bunsen Flame.*




The candle power of the original gas also affects the light which is to be obtained from the mantle.

If an ordinary burner and mantle be purchased and tested first with 16-candle gas, then with 15, and finally with 14-candle power gas, it is often found that it gives a better light with the 15 than the 16 candles, and a further improvement with the 14-candle gas. This, however, is dependent upon the fact that the burner is drawing in less than the necessary amount of air to give the best conditions of combustion in the inner zone, and that the right degree of aeration is being more and more nearly approached with the poorer gas. But when care is taken to ensure the correct ratio of air and gas consumed in each case, it is found that for qualities of gas between 14 and 18 candle power, there is a gain of about 3 per cent. in the light emitted by the mantle for each candle illuminating power in the gas.

When Welsbach first introduced the incandescent mantle, the burner which he used in 1885-86 consisted of a small bunsen burner of the ordinary type, with a tube of about the same length as in an ordinary laboratory burner, on to which was fitted a gallery to carry a chimney, and a head stamped out of thin sheet metal. The length of the fitting was, however, objected to by consumers who had up to that time only been accustomed to screwing a flat-flame or Argand nipple on to their fittings; so the burner tube was very soon shortened, and the head carrying the gallery, which fitted over it, was made to slightly increase this length.

Many forms of these burners have been used; the differences being chiefly dependent on the construction of the head. Some consist of open circular slots, others of flat gauze discs with a small baffle in the centre, some had gauze domes, and others steatite or cut-metal tops. But, owing to the construction of the burner, they all had one peculiarity, and that was they under-aerated the gas before combustion; and, in consequence, a chimney was required with them in order to create an up-draught, and so bring air rapidly in contact with the burning gas on the surface of the mantle.

When no chimney was used, the unburnt gas from the inner zone had to travel a short distance from the surface of the mantle through which it was passing before it obtained the necessary air for its combustion; hence the layer of highest temperature was outside the mantle, which, in consequence, was not raised to the highest degree of incandescence. When the chimney was put on, however, the uprush of air that it created burnt the escaping gas on the surface of the mantle itself, and the best results were obtained. Burners of this class are still the ones most used; and it is now fully realized that if the amount of air sucked in by the burner is not at least half

the total volume of air that is needed for the complete combustion of the gas, a chimney of such length as to create a sufficient draught to consume all surplus gas on the surface of the mantle must be used. Taking a 14 or 15 candle power gas, a 6-inch chimney is generally sufficient to supply the necessary air; while with a rich gas, such as is supplied in Edinburgh, a 10 or 12 inch chimney is not too long for the work it has to do.

It is now beginning to be found that the chimney even is capable of improvement, and that if, instead of allowing all the air to be drawn up from the bottom, holes are made in the chimney just above the level of the burner head, the air impinges more directly on the mantle, and a slightly better result is attained; while the idea, originally due to Sir Edward Frankland, and revived every few years since, of heating the air supply by making it pass down between an outer glass and the chimney before ascending the interior of the chimney itself, has also been applied to mantle burners. Unless very carefully adjusted, however, the loss of light due to absorption by the glasses nearly makes up for the slight gain.

Mantle burners in which regeneration has been attempted have also been tried. But the fact that air or gas can be heated separately and then utilized to give a very hot flame does not apply to the mixture of the two; as when a mixture of air and gas is heated, oxidation of the gas commences, and the loss of combustible matter due to this cause outweighs the advantages of preheating.

Real improvements in the burners employed in mantle heating commenced in the early nineties. At this period, Chemin and Bandsept both began working at the idea of adding air to the gas in small portions so as to gain a more intimate mixture of the two before combustion. Chemin's burner, however, was never a practical success; but Bandsept succeeded in producing a burner which, up to the present time, has never been excelled. Using a conical injector of such a character as to spread the jet of gas issuing from it, he placed above it a short truncated cone, which upwardly converged in such a way that the area of the upward flow of the jet of gas practically filled it; and above this, again, he placed another cone of the same character having a still wider opening at the top. Several of these ever-widening cones being used, and a suction being created in each, air was allowed to be drawn in through small holes in the base of the cones, and, mingling with the upwardly flowing stream of gas and air, entered a larger upwardly diverging cone, which acted as an expansion cone and relieved the pressure that otherwise would have been created by expansion on nearing the heated burner head—the gases being finally mixed by passing through atomizers consisting of double layers of wire gauze, perforated metal thimbles, or other devices, which would complete the admixture of the air and gas immediately before combustion.

The work done by Bandsept in perfecting the bunsen for mantle heating was enormous; and on glancing back through his Belgian patents, one finds nearly every feature of such modern burners as the Kern had been worked out by him before 1896. His burners are still the best that have been introduced, and are, indeed, the form of chimneyless burner adopted by the French Auer Company.

In 1894, De Mare made a number of different forms of burner for his plumes and for mantles, and improved the suction given by his jet of coal gas by placing above it a tube having the form of two cones united at their summits, which largely increased the uprush of the mixture, and also added slightly to the amount of air drawn in with the gas. The so-called "Simplex" burners, which are now largely used, are made upon the principles enunciated by De Mare in his patent.

In the burners made upon the principles first put forward by Bandsept and De Mare, the superior rigidity of the flame, due to the increased rate of outflow of the mixture and the aeration being brought up to the best point for exciting the incandescence of the mantle, the chimney can be dispensed with. Perhaps the best known chimneyless burner at the present time is the highly vaunted Kern burner, in which the form of head devised by Bandsept in one of his earliest patents is added to the suction-tube, formed of truncated cones, patented by De Mare, giving a burner which yields practically the same photometric results.

It must always be remembered that the statements of illuminating power yielded by various incandescent mantles and burners is always open to the interference of several important factors, the chief one among which is fit of the mantle. Most observers seem to imagine that as long as the mantle will go over the burner head, and the rod that supports it is of the prescribed height, the full illuminating power which the burner and mantle are capable of yielding is given. This, however, is an entire mistake, as unless the mantle not only fits the head, but also the flame, perfectly, serious discrepancies at once arise. And although, when a perfectly fitting mantle is obtained, such chimneyless burners as I have described will give as high as 24 candles per cubic foot of gas consumed, they are just as often found to give only 14 candles. If the burners and mantles commercially sold be taken and tested carefully, the average comes out at about 18 or 19 candles per cubic foot of gas. Until absolute uniformity in the construction of the burner, and in the shape of the mantle, can be obtained, these discrepancies cannot be avoided, and it is only by taking the greatest possible precautions that fair results can be obtained.

I cannot help thinking that manufacturers make a very great mistake in claiming illuminating powers for their mantles and burners which have only been obtained in isolated cases where by chance perfect conditions have been attained, as the non-fulfilment of the results in practice gives rise to disappointment to consumers, and discredits the particular form of burner.

In conclusion, I can only regret that the shortness of the course has prevented me from dealing with a large number of points which otherwise I would have liked to have touched upon.

## DETERMINATION OF BENZENE AND ETHYLENE IN COAL GAS.

The following is an abstract translation of a contribution by Professor F. Haber, Ph.D., to the "Journal für Gasbeleuchtung," on the above-named subject.

Last year, Dr. O. Pfeiffer described a modification of the method of Harbeck and Lunge for the determination of benzene in coal gas.* He has since referred to his method as the most rapid and exact of any existing system. His retrospect of the latter does not, however, allude to the method of Haber and von Oechelhaeuser.† The author consequently is constrained to draw attention to this plan, the utility of which has been substantiated by further researches.

The method, as already described, determines the benzene and ethylene in coal gas by difference. The total amount of benzene and ethylene is found by the usual absorption plan; and then the ethylene alone is determined by titration. The titration depends on the fact that ethylene and bromine vapour combine forthwith, and form ethylene bromide; while benzene vapour and bromine vapour do not act on one another. It does not appear necessary to quote further experimental results in support of the observation that the bromination of ethylene takes place quantitatively, as Treadwell and Stokes and C. Winkler have likewise found that it is correct. But Haber and Oechelhaeuser were the first to point out that, under suitable experimental conditions, benzene vapour is so far indifferent to bromine vapour that an analytical method may be based on this indifference. An oral communication by Dr. Bunte, to the effect that the condensation product of the washing of coal gas with bromine contains much unbrominated benzene, drew their attention to the subject of the action of bromine and other halogens on benzene. They ascertained that air, to which 2·5 to 2·6 volumes per cent. of benzene had been added, might be agitated for two minutes in a Bunte burette in diffused light, with bromine water, without the strength of the latter being affected, provided the bromine water was such that 10 c.c., after addition of any excess of potassium iodide, required, on titration, about an equal volume of decinormal solution of thiosulphate.

This fundamental observation was verified by experiments in three different directions, with great exactness. In the first case, it was proved that extension of the time allowed for the reaction of the benzene vapour on bromine vapour to many hours, did not effect a reaction between them to any considerable extent. Next the mass of the reacting gases was made sufficiently great for a very slight conversion to fall within the limits of estimation of the product; and, thirdly, mixtures of the vapours produced by the gasification of commercial benzol, which is not quite pure, were employed, as well as benzene vapour. The first two modifications aimed at proving that benzene vapour and bromine vapour react at the most only in infinitesimal quantities; while the third was directed to overruling the objection that coal gas contains, besides benzene, small quantities of its higher homologues, which might cause some deviation in the action. The results of experiments in these directions, carried out in conjunction with Herr S. Leskiewicz, confirm the exactness of the method described, and give it fresh support.

The system of Harbeck and Lunge is of quite another nature. It consists in converting the benzene to dinitrobenzene, which is weighed. Dr. Pfeiffer's modification of the method, which he regards as a simplification of it, consists in agitating a sample of the gas with nitro-sulphuric acid, in place of passing a stream of the gas through the acid. The system of Harbeck and Lunge is comparatively tedious. It was, however, not intended by its inventors for use for technical purposes, but rather for precise determinations. Dr. Pfeiffer's modification does not appreciably lessen the tediousness of the method.

The researches, of which the results have been referred to in the foregoing, on the behaviour of bromine water and benzene vapour, were carried out in the manner described below.

*Experiments with Bromine Vapour and Benzene Vapour.*

Two thin glass bulbs were filled, one with commercial bromine, the other with pure benzene, free from thiophene, and twice fractionated within 1° C. They were introduced with some pieces of glass into a separating funnel of 4·375 litres capacity. The funnel was then exhausted as completely as possible, and shaken strongly until both bulbs were thoroughly shattered, and their contents vaporized. The funnel was then left for some time; and afterwards 200 c.c. of 3½ per cent. solution of potassium iodide was introduced through the outlet-nozzle of the funnel. The pressure was then equalized, and the iodine liberated in the funnel titrated with standard solution of thiosulphate. A blank

* See "JOURNAL," Vol. LXXIV., p. 1121. † *Ibid.*, Vol. LXIX., p. 410.

testing was next made to ascertain the consumption of the thiosulphate when a bromine bulb only was introduced into the funnel. All the tests were carried out at the temperature of the room (about 61° Fahr.). The results are given in the annexed table.

| — | Weight of Bromine. | Weight of Benzene. | Time allowed for the Action of the Benzene on the Bromine. | Amount of Solution of Thiosulphate Consumed. | |
|---|---|---|---|---|---|
| | | | | Total. | Per Gramme of Bromine. |
| | Gramme. | Gramme. | | Cub. Cent. | Cub. Cent. |
| 1 | 0·6472 | 0·1720 | 20 minutes. | 39·80 | 61·50 |
| 2 | 0·5862 | Nil. | .. | 36·10 | 61·60 |
| 3 | 0·4241 | 0·1705 | 20 minutes. | 26·15 | 61·66 |
| 4 | 0·7898 | Nil. | .. | 48·55 | 61·47 |

The strength of the thiosulphate solution agreed at the beginning and end of the experiments. It was 0·20516 time the strength of normal solution. Theoretically, 60·93 c.c. of this solution would correspond to 1 gramme of bromine. Probably a little chlorine in the commercial bromine employed accounted for the consumption of thiosulphate actually being rather greater. The change in the consumption of thiosulphate due to contact of the benzene vapour with the bromine was practically *nil;* whereas if the benzene were converted to monobrom-benzene, the thiosulphate consumed would have been less by 10·6 c.c. in the first, and by 10·7 c.c. in the second experiment, than when that reaction did not occur. The percentage of benzene vapour on the volume of the separating funnel was 1·2 per cent. in both cases, which is about the same as the percentage of benzene vapour in ordinary coal gas. Hence the bromine had not acted upon the benzene vapour in the funnel.

*Experiments with Bromine Water and Benzene Vapour.*

The same quality of benzene was used as in the preceding experiments. A bulb containing benzene was introduced into the separating funnel, which was then exhausted, and 75 c.c. of bromine water was admitted through the outlet-nozzle in the following manner: The funnel was inverted, and the outlet-cock was opened very slightly, while the above volume of bromine water was run into the tubulure of the outlet-cock, from a pipette, at the rate at which it passed into the funnel. The tubulure was then washed by running in, by the same method, 25 c.c. of distilled water. The bromine vapour which remained in the pipette, and the drops of bromine water collected near the nozzle of the pipette, were expelled into a solution of potassium iodide for estimation. A blank testing, in which the benzene vapour was omitted was carried out between each pair of experiments. The bromine water was stored in a 4-litre flask. The following results were obtained:—

| | Amount of Thiosulphate Solution used. |
|---|---|
| Without benzene | 33·5 c.c. |
| With 0·1610 gramme benzene in diffused light at 60° Fahr. for 20 minutes | 33·4 |
| Without benzene | 33·5 |
| With 0·1940 gramme benzene in diffused light at 61° Fahr. for 20 minutes | 33·3 |
| Without benzene | 33·33 |
| With 0·1980 gramme benzene in feeble daylight at 61° Fahr. for 3 hours | 33·1 |
| Without benzene | 33·3 |
| With 0·1340 gramme benzene overnight at 62° Fahr. for 15 hours | 32·7 |
| Without benzene | 33·05 |

The results showed that the strength of the bromine water, as indicated by the testings made without the benzene, gradually decreased, according as air was admitted to the storage flask to replace the bromine water removed. The treatment with benzene reduced the strength of the bromine water to a very small extent. In the most prolonged test, which lasted 15 hours, the reduction in strength was equivalent to

$$\frac{33{\cdot}3 + 33{\cdot}05}{2} - 32{\cdot}7 = 0{\cdot}47 \text{ c.c.}$$

of thiosulphate; whereas complete conversion of the 0·1340 gramme of benzene used to bromobenzene, would have caused a reduction in strength equivalent to 8·44 c.c. of thiosulphate. In the test which lasted for 3 hours, the actual reduction was 0·215 c.c.; the theoretically possible would have been 12·5 c.c. In the two tests which lasted 20 minutes, the actual reduction was yet smaller. Thus it appeared that reaction took place very slowly between the bromine and benzene. It was probably favoured by the presence of a comparatively large volume of water. But in view of the fact that, in the course of 20 minutes only 1 per cent. of the theoretically possible conversion occurred, it was reasonable to conclude that in the two to three minutes treatment of coal gas with bromine water, which is prescribed by Haber and von Oechelhaeuser, practically no reaction at all would take place. It could only extend to a few thousandths of the volume of benzene present; and as this does not exceed 1·5 per cent. of the gas, it would be quite inappreciable in its effect on the result, even in exact analyses, putting aside rougher technical observations.

*Experiments with the Vapour of Impure Benzene and Bromine Water.*

An impure benzene of which 48·5 per cent. distilled between 79—80° C., 30·5 per cent. between 80—83° C., 13·5 per cent. between 83—100° C., and 6 per cent. above 100° C. was used, with bromine water of about half the strength of that previously employed; and 150 c.c. of the bromine water was taken for each test. In the separating funnel, therefore, there were present during the time allowed for the reaction the 150 c.c. of bromine water and 50 c.c. of water used for washing the tubulure of the funnel. The following results were obtained:—

| | Amount of Thiosulphate Solution used. |
|---|---|
| Without benzene | 37·65 c.c. |
| With 0·1420 gramme benzene in diffused light, at 65° Fahr. for 20 minutes | 37·25 |
| With 0·1770 gramme benzene in Welsbach gaslight, at 65° Fahr. for 20 minutes | 36·88 |
| Without benzene | 36·52 |
| With 0·1615 gramme benzene, at first in Welsbach gaslight, then overnight for 14 hours, at 65° Fahr. | 35·6 |
| Without benzene | 35·6 |

Reduction in strength of the bromine water took place more rapidly than in the earlier series of tests. The change in strength, due to the treatment of the bromine water with the benzene vapour, was, however, in the last series so small that it seemed doubtful if any reaction occurred.

In all the cases investigated, however, the action observed between bromine vapour or bromine water and benzene vapour was so slight that it was negligible so far as the analytical process of Haber and von Oechelhaeuser was concerned. Indeed, the reaction which was observed to occur after some time might clearly have been due to impurities in the bromine, which was merely a good commercial sample. Such bromine was chosen for the work intentionally, as the process was intended for technical use, in which only the commercial article could reasonably be employed. It would, however, be improper to employ any grossly impure bromine for the work.

In conclusion, the method of working employed by Haber and von Oechelhaeuser may be described afresh. The capacity of the portion of a Bunte burette between the lowest mark and the stopcock is determined. Then about 90 c.c. of the gas to be examined is introduced into the burette, and the volume so taken is read off. The water is drawn from the burette exactly down to the stopcock; and then after a lapse of some minutes the water which has run down from the sides of the burette to the capillary is likewise drawn out. Then 35 c.c. of bromine water from a large storage vessel is taken in a cup, and 10 to 15 c.c. is run up into the burette, and the level is read. Next a few drops of water are run up to wash the bromine water which remained in the capillary into the burette. Then, by inclining and rotating the burette, the gas-space is filled with bromine vapour. Sufficient bromine water should have been used to give the gas-space of the burette a brown colour. After two or three minutes, strong solution of potassium iodide is admitted and agitated. The contents of the burette are then washed completely into a beaker; and the free iodine present is determined by titration with thiosulphate. The pressure and temperature are observed at the same time.

Both before and after the test 10 c.c. of the bromine water is taken from a cup by means of a pipette (previously washed out with bromine water), and discharged by blowing into potassium iodide, which is then titrated. The pipette should have been calibrated for discharging in this manner. The mean of these two titrations is taken for calculating the result. One litre of decinormal solution of thiosulphate corresponds to 1121 c.c. of dry ethylene at 0° C. and 760 mm. The volume of gas under these conditions is converted in the usual manner to the corresponding volume when saturated with aqueous vapour at the prevailing pressure and temperature of the room. The volume of ethylene is calculated from the difference between the strength of the volume of bromine water used in the burette and that of an equal volume of the original store of bromine water as found from the mean of two titrations. The bromine water should be of about decinormal strength, or even rather weaker.

It is to be observed that, in determining the volume of the lower portion of the Bunte burette by weighing the water which runs from it, some more water collects, owing to draining from the sides of the burette, after the first lot has been run off; and this additional amount must not be ignored. The volume to the stopcock only, and not to the nozzle of the burette, is dealt with. The water which remains in the nozzle below the cock, when the bromine water is about to be admitted, passes up with the latter into the burette.

## WATER-HAMMER IN PIPES.

In the "Review of the Continental Press" in the current number of the "Engineering Magazine," the above subject is dealt with. The writer points out that, though the action of what is generally called "water-hammer" or "hammer-blow" in mains has so often made itself apparent that its effects are well known, precise knowledge as to the causes and actual magnitude of these shocks has been lacking, owing to the experimental study of the subject having until recently been very slight. Some experiments made by Professor R. C. Carpenter, of Cornell University, at Ithaca, gave data concerning water-hammer in small pipes; but apart from these, the subject had

not been scientifically investigated until some recent, and very valuable, experiments in Russia. Made under the supervision and at the instance of M. Nicholas Simin, Chief Engineer of the Moscow Water-Works, and conducted in detail by Professor N. Joukowsky, of the Moscow Imperial Technical School and the Moscow Imperial University, they are discussed very fully in a paper presented by the latter before the Academy of Sciences of St. Petersburg, of which the following is an abstract.

The observations were made upon pipes of 2, 4, and 6 inches in diameter, laid upon the ground, and connected with the 24-inch main of the Moscow water system; valves at the ends of the pipes allowing the flow to be interrupted very quickly to produce changes in the hydro-dynamic pressure in the pipes. The results of the tests are especially interesting, since they show what had hitherto not been known—that all the phenomena of hydraulic shock may be explained by the formation and propagation of shock-waves in the pipes; these waves being due to the compression of the water and the extension of the walls of the pipe. After a review of the various theoretical studies which had previously been made of the action of shock in water-pipes, including the account of the experiments of Professor Carpenter, Professor Joukowsky goes on to describe the arrangement of the apparatus used in making the tests from which his deductions were made. The pipes were laid in the yard adjoining the Alexiew pumping-station, the lengths being as follows: 2 inch, 2494 feet; 4 inch, 1050 feet; and 6 inch, 1066 feet. The pipes were so laid that the terminals came close to the points of departure from the large main; thus enabling the same observers to control the closing of the valves and the observation of the instruments at both ends. Arrangements were provided for weighing the quantity of water discharged from any pipe in a given time, and by previous calibration the velocity required to discharge a known weight of water had been determined; so that this weighing of the water gave an accurate measure of the velocity in a pipe at any experiment. Several devices were employed for determining the pressures. A series of Bourdon pressure-gauges were placed at known intervals along the lengths of the pipes, and provided with friction indicators, showing the maximum pressure to which the needle attained for any test. The rapidity of propagation of the shock-waves was measured by a chronograph, recording, by means of electrical connections, the time of shock at points 700 feet distant; while the rise and fall of pressure at various points in the pipes was recorded by a special arrangement of the Crosby indicator. The corrections required in the use of these instruments are discussed in the paper, and the readings are tabulated and specimens of the diagrams given. The conclusions arrived at are as follows:—

1.—The hydraulic shock is propagated along the pipe with a constant velocity, which, so far as could be observed, is independent of the magnitude of the shock. This velocity is dependent upon the material of the pipe and upon the ratio of the thickness of its walls to the diameter of its bore. For ordinary cast-iron water-pipe, this ratio diminishes somewhat as the diameter increases; and hence the velocity of the shock-waves is somewhat less for large pipes than for smaller ones. For pipes of moderate size—2 to 6 inches bore—the velocity is about 4200 feet per second; and for larger pipes, of (say) 24 inches bore, it is about 3290 feet. The velocity of the shock-wave is the same whether the shock is produced by arresting the flow at the discharge of the pipe, or by suddenly raising the pressure at the beginning.

2.—The hydraulic shock acts with uniform force upon the length of the pipe. Its magnitude is proportional to the loss in velocity of the flow of the water and to the velocity of propagation of the shock-waves in the pipe itself. For ordinary cast-iron pipe of 2 to 6 inch bore, we have for each foot of velocity lost by the water a shock of about 4 atmospheres; while for a pipe of 24 inches diameter the shock is about 3 atmospheres.

3.—The existence of a periodical oscillation of a shock in a water-pipe is indicated by the reflection of the shock-wave between the beginning and end of the pipe.

4.—The flowing water has seemingly no influence upon the shock; this appearing to be dependent only upon the loss of velocity. The shock is reflected just the same in a pipe through which water is flowing as in a vessel containing stationary water, other conditions being equal.

5.—A dangerous increase in shock may appear in the passage of the shock-wave from a pipe of large diameter to one of smaller diameter. In such a case, the force of the shock, when it reaches the closed end of the pipe, is doubled; and as this doubling may be repeated several times, the pressure may attain great magnitude.

6.—The simplest method of preventing shocks in water-pipes is to introduce devices compelling the slow opening and closing of valves and cocks. For this purpose the time required to close the valve should be proportional to the length of the pipe. Air chambers, if placed in the line of the pipe near the valve, will almost entirely prevent the shock; but it is difficult to keep them filled with air. If a safety-valve is placed upon the pipe to relieve the pressure, it leaves a shock depending upon the strength of the spring.

7.—Shock diagrams taken from different points in a pipe enable the position and magnitude of accumulations of air to be determined. The shock diagram may also be used to determine the location of a leak in a pipe, and to obtain general information as to its condition.

# REGISTER OF PATENTS.

**Anti-Vibratory Incandescent Burners.**—Fritt, G. H., Bentham, F. H., and Stott, J. H., of Bradford. No. 9380; May 4, 1899.

The object of this invention in connection with burners for incandescent gas lighting, is to arrange the parts of the burners so that they will effectually prevent vibratory shocks destroying the mantles. It consists essentially in the use of an adjustable ring fitted in the bunsen tube to support the spring carrying the body of the burner; an adjustable ring fitted in the bunsen tube within the spring supporting the body of the burner, so as to prevent undue oscillation of the upper portion of the burner; a conical tube made to slide up and down on the bunsen tube, and within the part carrying the outer body of the burner, so as to allow universal movement, and at the same time prevent the passage of gas or air from or into the burner; and other small detail improvements.

**Gas-Engine Exhaust Silencers.**—New, A. G., of Woking. No. 12,357; June 14, 1899.

This invention is designed to allow of the intermittent discharge of the exhaust gases from gas-engines, by the combination of a chamber into which the gases are discharged, and a valve controlling their escape from the chamber, arranged in such a manner that the valve is closed during the periods of discharge, and opens between those periods, whereby the velocity at which the exhaust gases escape from the chamber is reduced.

*Fig. 1.*

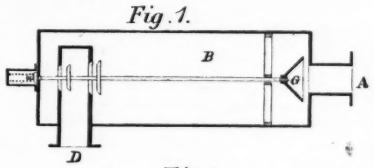



*Fig. 2.*

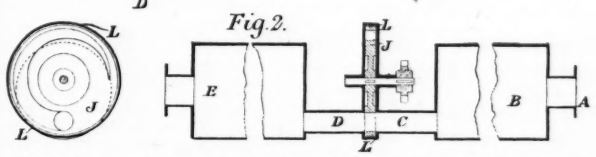



Fig. 1 is a longitudinal section of an automatically operated silencing device; fig. 2 shows one mechanically operated.

B is a chamber into which the exhaust gases are led from the engine through the pipe A. The only means of escape from B is through the pipe D, which is controlled by a valve or valves.

In fig. 1 a pair of valves are fixed upon a spindle F, provided at the one end with a funnel-shaped mouth G, and at the other end with a spring, which tends to keep the sliding-spindle in the position shown. The passage D (fig. 1) is provided with openings into the chamber B; and these openings are so shaped and arranged that the valves can completely close them if the spindle be moved longitudinally in its bearings or guides (from right to left), against the action of the spring.

The manner in which the device works is as follows: When, during the exhaust stroke of the engine, the exhaust gases enter the chamber B, they impinge upon the funnel-mouth G, thereby causing the spindle to slide longitudinally, and consequently close the openings into D. The exhaust gases are therefore unable to escape until their action upon G has ceased, and until the spring has been able to cause the spindle to return to its original position. The valves are then removed from the openings, and the gases are enabled to escape to the atmosphere. The velocity at which the gases escape will be less than that at which they entered the chamber B, owing to their temporary retention.

In fig. 2 a rotary valve, consisting of a disc J mounted on a shaft in bearings in a case L (the disc having a circular and tapering slot), controls the escape of the exhaust gases from the chamber B to a second chamber E, through the pipes C and D. The chamber E may be in open communication with the atmosphere through a suitable passage, or the passage may be provided with a second controlling valve similar to the one formed by the disc J. The valve-shaft is provided with a chain-wheel driven by the engine at a constant speed—at as many revolutions per minute as there are exhaust strokes per minute; and the relative positions of the disc J to the operations forming the complete cycles of the engine, are such that the disc, during each cycle, interrupts free communication between the pipe C and the pipe D, in the periods when the exhaust gases are entering the chamber B, and gradually establishes free communication between them during the intermediate periods.

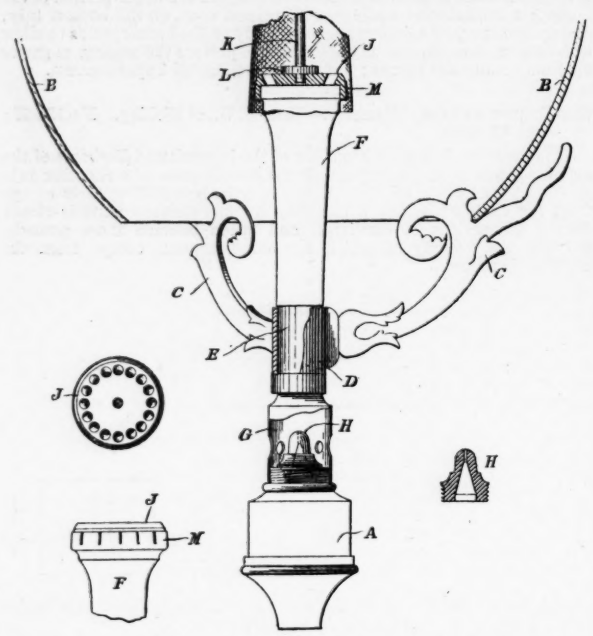
**Street-Lanterns for Incandescent Gas-Burners.**—Talbot, H., of East Dulwich, S.E. No. 13,310; June 27, 1899.

The object of this invention is to so construct a street-lamp lantern that it may be readily removed for repairing purposes, without necessitating the dismounting of the burner and incandescent mantle. This is attained by forming the lantern without a bottom, and attaching to the lantern frog or cradle, or any other lantern plate, a frame, on to which the lantern is fitted, and to which it is secured in any convenient manner by adjustable clips or catches, after the burner has been fitted to the service-pipe. In this way, the lantern can be lifted off the pillar for repairs, without removing the burner.

**Low-Pressure Incandescent Lighting Apparatus.**—Sugg, W., of Westminster. No. 23,398; Nov. 23, 1899.

Any detailed account of the patentee's proposal is unnecessary, as full particulars of his present invention were given in the "JOURNAL" for March 13, p. 680. It may, however, be pointed out, in giving on p. 1442 the illustration accompanying the specification—an elevation, partly in section, of the whole apparatus, as arranged for "low-pressure" incandescent gas lighting; a top plan view of the burner proper; the manner of securing the burner proper in the mouth of the burner-tube,

which will be what is known as an "air burner," as is usual in burners for incandescent gas lighting, but specially modified for the purposes of this invention; and a sectional elevation of the gas-nozzle—that the claims made are as follows: 1.—A low-pressure apparatus for incandescent gas lighting, under ordinary circumstances, consisting of a governor, a globe supported by arms carried by the burner, an air-burner, and a mantle, all combined and arranged as shown. 2.—An air-burner consisting of a disc of steatite ½ inch thick, having a solid central portion, and one row of holes near the edge, the axes of the holes being at an angle of 25° from the vertical. 3.—The combination with the burner proper of a heat-resisting peg for carrying the mantle, provided with a




disc or washer of steatite, to ensure the steadiness and verticality of the peg. 4.—Placing the burner proper at the end of the burner-tube, at a distance at least of 4½ inches from the tip of the gas-nozzle. 5.—A gas-nozzle adapted to supply a stream of gas at the rate of 4 cubic feet per hour, having a straight outlet-passage of slightly less than 1 mm. in diameter, and length of 4 mm., in combination with a chamber having inlet-holes for air in the walls—the gaz-nozzle being arranged with relation to the air-holes so that the tip of the nozzle shall be slightly above the line of the top of the holes. 6.—Means for holding the steatite burner consisting of spring tongues formed around the edge of a bell-mouth burner-tube, by cutting a series of nicks therein, and adapted to press with an elastic pressure upon the edge of the burner.

**Lighting Gas from a Distance.**—Anspach, J., of Berlin. No. 4606; March 10, 1900.

This invention relates to a pneumatically-operated device, which allows one or more gas-lights to be ignited from a distance by means of a lighting-flame or a self-igniting device. It relates further to a peculiar form of construction, which enables several jets connected with the same air-pipe (for instance, the jets of one or more gas-rings or separate single burners) to be lighted successfully, in such a way that, according to practical requirements, a suitable limited number of all the connected jets may be lighted or extinguished as desired.

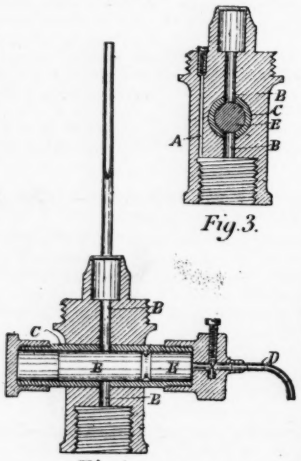



Fig. 3.

Fig. 1. Fig 2.

Figs. 1 and 2 are vertical sections at right angles to each other, of the arrangement for a burner having a pilot or constantly burning lighting flame. Fig. 3 is a section (corresponding to the one in fig. 2) of a burner in which the escaping gas is not ignited at a pilot or lighting flame, but by condensation and absorption in a platinum fabric, or at a chemically-acting lighting device.

In figs. 1 and 2, the body which is to be screwed on the mouth of the gas-pipe is provided with two longitudinal bores A, B, and a cross bore C. The always-open bore A leads to the pipe of a constantly-burning lighting-flame. A pipe is inserted in the bore C, which pipe is closed at one end by a cap, and at the other end stands in communication with the pipe D of the air-duct, and contains an easily-moving regulating piston E. The latter has an annular recess which, in the right-hand end position shown in the drawings (which is produced by the suction of air), is displaced away from the bore B, so that no gas can pass through it to the burner, and thus come in contact with the lighting-flame. If, on the other hand, the air be compressed in the pipe D, the piston E moves into its left-hand end position, in which the recess coincides with the bore B; and the gas then flowing through it is ignited at the lighting-flame. The passage may be more or less closed by a pointed screw entering a recess below. In fig. 3, the bore A is closed by means of a screw; and the escaping gas is ignited at a self-lighting device arranged over it.

If several burners provided with this arrangement are connected by branch-pipes D with a main air-pipe, at the ends of which an air-suction apparatus and pressure-pump are situated; and if the separate air-ways are graded by adjusting the screws to different depths in a certain succession in size, on the compression of the air by means of the pump, the piston E will be first moved to the left, for the purpose of lighting the burners belonging thereto, which has its cylinder connected with the passage with the widest opening. On the further compression of the air, there will then be displaced the piston whose cylinder connects with the passage of the next narrower opening or section; and the lighting of the burner belonging thereto will take place. In this way, two jets will be burning. On further compression of the air taking place, a third, fourth, and so forth, jet is lighted—and always in the succession of the decreasing size of the air-passage to the separate regulating piston—until finally all the jets connected with the pipes are lighted; while any limited number of jets may be lighted, if, after the lighting of the last jet which is to be lighted, the piston of the air-pump ceases to compress.

**Gas-Engines.**—Dougill, A., of Leeds. No. 5089; March 17, 1900.

This invention has for its object the construction of gas-engines in such a manner that the end of the piston exposed to the explosions of gas and air may be retained at a lower and more even temperature than is the case where the pistons are of the ordinary kind. In this way, the liability is reduced of the end of the piston exposed to the explosions becoming unduly heated and expanding, so that the friction of it against the cylinder is increased to such an extent that the liability of the piston "jamming" within the cylinder is obviated. This is accomplished by constructing the piston with a water-jacket or chamber within it, having inlet and outlet openings arranged so that water may flow through the jacket or chamber in such a manner that the piston is retained at a temperature about equal to that of the cylinder.

## APPLICATIONS FOR LETTERS PATENT.

8860.—Tweedie, R. O., "Burners for incandescence gas lighting." May 14.
8890.—Peard, R. B., "Gas-stoves." May 14.
8937.—Vahle, J. A., and Davies, C. J., "Acetylene gas generating apparatus." May 15.
8942.—Hooker, W., "Incandescent gas-burners." May 15.
8958.—Metz, C. H., "Gas-engines." May 15.
8973.—Genese, D., "Acetylene lamps." May 15.
8983.—Coulson, M., and Clayton, R., "Fire-places for burning gaseous or liquid fuel." May 15.
9013.—Maccallum, P. F., "Internal combustion engines." May 16.
9026.—Stansfield, A., and Meters, Limited, "Prepayment gas-meters." May 16.
9055.—Dawson, C. E., "Internal combustion engines." May 16.
9088.—Plaissetty, A. M., "New process for the incandescence of gas." May 16.
9094.—Saville, G. E., "Scrubbing apparatus for the removal of ammonia and other impurities from coal gas." May 17.
9127.—Grundy, F. B., "Incandescent mantles." May 17.
9142.—Strong, H. A., "Method of cooling gases." May 17.
9174.—Anderson, J., "Coin-freed gas-meters." May 18.
9285.—Germantz, W., and Erste K. K. priv. Metallsärge auch Ornamentenfabrik and Leichenbestattungs-Unternehmung "Concordia" A. M. Beschorner, "Water-meters." May 19.

**Preventing the Pollution of the Leeds Water Supply.**—In connection with the Leeds Water-Works, the Corporation are now the owners of 32 farms at Fewston, representing 565 acres, nearly the whole of them having been purchased without arbitration. The Water Committee have now to face the remaining larger and more important landowners, who will not come to terms; and there are in all 78 owners yet to be dealt with. As the farms come into the possession of the Committee, everything possible is at once done by sewering and drainage works to prevent any chance of the city water supply being polluted.

**Bingley Gas Affairs.**—In his annual statement on the working of the Gas Department at the meeting of the Bingley District Council last week, Mr. Gatecliff mentioned that, in the year ending Dec. 31 last, the total production of gas was 94,501,600 cubic feet—an increase of 8,573,600 feet compared with the previous year. The total sales amounted to £11,291; and residuals produced £2491. The gross profits were £1792; but he explained that, owing to increased expenditure, the balance of profit was only £22. Discussing the effect of the higher cost of coal, he said there was no doubt that during the coming year it would mean an additional expenditure of from £1500 to £2500. Under these circumstances, he should suggest at the next meeting of the Committee that the price of gas be advanced 3d. per 1000 cubic feet. It was expected that there would be an increase in the receipts from coke and other residuals; and he thought an advance of 3d. would be sufficient to meet the extra expenses. A special meeting of the Committee is also to be held to consider the question of the purchase of the Cullingworth Gas-Works.

# CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

### Mr. Carpenter's Paper on Inclined Retorts.

SIR,—Your correspondent, Mr. Brackenbury, confuses the issue to the solution of which my paper was offered as a contribution.

The mechanical and the carbonizing efficiency of a retort house plant are two different things. I did not consider it desirable to incur the expenditure necessary to carry the former to its extreme limit. But, as regards the latter, I omitted no precaution necessary to attain a high degree of success.

With regard to the selection of coal. A Durham contractor said, in my presence, last year: "We can get an extra 6d. per ton for our coal on the Continent, as it suits their inclined retorts." I need not point out that a good deal of money may be spent in the retort-house to save 6d. per ton on the coal handled there.

Mr. Brackenbury's gibes at London Engineers show that, on at least one other subject besides that under discussion, he speaks without personal knowledge.

*May* 28, 1900. CHARLES CARPENTER.

### The Calorimetry of Coal Gas.

SIR,—Mr. J. F. Simmance, in your issue of the 22nd inst., takes the trouble to emphatically dispute a claim which has never been made either by Dr. Colman or Professor Junkers, nor by myself as agent for the latter. The claim that has been made, and I venture to think substantiated, is that Professor Junkers has constructed a calorimeter which is new, practical, and effective—not that he has introduced into England the principle of absorbing the heat from a stream of gas products by a stream of water (the two being separated by thin walls of metal). After reading Mr. Simmance's letter and consulting his references, nobody will deny that Mr. Hartley invented a calorimeter in which this principle is used; but that does not appear to give him a claim to be considered the inventor or co-inventor of Junkers' calorimeter.

Unfortunately, the description of the Hartley instrument in the Transactions of the Gas Institute of 1884, p. 123, is so vague that it is hard to say exactly how it worked. This much, however, is quite clear from comparison—that the two instruments, although both calorimeters, are at least as widely different inventions as (for instance) the Lenoir and the Otto inventions, although both are gas-engines.

Does Mr. Simmance consider it an injustice to the memory of Lenoir that the engine invented by Herr Otto, of Cologne, is not called the "Lenoir-Otto" gas-engine?

*May* 25, 1900. HERMANN KÜHNE.

# PARLIAMENTARY INTELLIGENCE.

### Gleanings from the Committee Rooms.

The work of Mr. Oldroyd's Committee has made the past two weeks remarkable in the annals of the gas industry; and in that work one can see some of the lines on which future gas legislation will run. While adhering to their objection to a floating standard of illuminating power and price, the terms in which they delivered their decision the previous Friday on the South Metropolitan Bill enabled the Committee last Wednesday to so broaden the conditions as to make it possible for the Company to accept them, and to proceed with the Bill; and if no evil befals it in its future stages, a great precedent will have been set for the supply of natural coal gas, unencumbered by enrichment. With one burden less to bear—and it is a big one, too, in many cases—gas undertakings will meet with still greater ease the competition of other forms of light, heat, and power. The charges for prepayment meter supplies in the Metropolis have also been brought under regulation in a manner which will hurt no one, and which will not blight the prospective development of the system. We have also seen the utter rout of the forces from Spring Gardens, who have been engaged in the inglorious task of trying to erect barriers across the path of progress.

Reviewing the work of the week in the order in which it was undertaken, the first two days were occupied by the Committee in considering the lightest and final Bill on their list; and no doubt the honourable members were right glad to be within sight of the end of a particularly tiresome set of measures. This last Bill was that promoted by the Wandsworth and Putney Gas Company, who came before the Committee with a clean record, and results which testified to good management, and a liberal consideration for the interests of the consumers. In the policy which has brought about this condition of things, one can trace the influence of the master-mind of Mr. H. E. Jones, who is a Director of the Company, and years ago was the Engineer—a position which his son (Mr. H. H. Jones) now occupies. Even in the case of this well-managed Company, the London County Council appeared as opponents; but why, one cannot conceive, unless it be through sheer officiousness. The Company supply 14-candle power gas at 2s. 2d. per 1000 cubic feet; and their present capital is only equivalent to £339 per million cubic feet of gas sold. If such figures do not speak well for a Company, and commend it as worthy of being trusted with greater powers, then it is difficult to see what will do so. The Company asked to be allowed to convert their capital, to which the stock objection was raised that it concealed from the public the fact that respectable dividends were being paid. Then the Company wished to raise additional capital, not exceeding £300,000, by the creation and issue of ordinary stock, with borrowing powers to the extent of one-third; and Mr. Balfour Browne advanced very good reasons for the granting of such large powers. Authorization to close certain useless lanes intersecting the site on which the Company propose to carry out some considerable extensions was also sought. Among the several unreasonable requirements of the County Council, they pressed for the Company being placed under similar provisions to those in force in connection with the three large London Companies; but why this Company more than any other Suburban Company was not made clear. They also asked for a reduction of the initial price of 4s., and objected to the Company's request that certain buildings should be exempt from the provisions of the London Building Acts. Like the County Council, the Wandsworth District Board of Works opposed on every conceivable point, although, it appeared, a Committee of the Board had arrived at an agreement with the Company, which the Board afterwards repudiated.

Mr. H. E. Jones was the first witness for the Bill; and after he had given the Committee a large supply of irrefutable evidence, a suggestion came from Mr. Worsley Taylor, for the County Council, that possibly an adjournment would result in a settlement. A conference took place; but the following morning found the parties as far from agreement as ever—the propositions of the opponents being so extreme that the Company could not possibly accept them. In fact, all through the proceedings before this Committee, the County Council had shown themselves so irrational that the Chairman more than once in the closing sittings evinced a little passing irritation. Under the circumstances, the Company's case proceeded; and Sir F. Bramwell, Mr. Corbet Woodall, Mr. E. H. Stevenson, Mr. H. H. Jones, and others all testified to the reasonableness of the Company's proposals. After such a compact body of evidence, the County Council were evidently convinced that further serious opposition would be futile; and they contented themselves with magnanimously throwing up the sponge on the understanding that clauses on certain minor matters would be introduced. The Wandsworth District Board offered a little resistance to some of the proposals, but with unimportant effect; and an appeal for a reduction of the standard price was also made on behalf of Battersea. Without calling on Counsel for the promoters to respond, the Committee passed the preamble of the Bill, subject to certain conditions previously offered by the promoters. Before the clauses were considered on Wednesday, the Wandsworth Board retired. The new clauses provide for the widening by the Company of Warple Way (which came into prominence in the building-line litigation), for a specified purity and pressure of gas, and for the setting up of an additional testing-station at the Town Hall or in some other sufficient building. The photometers to be used for the purpose of testing the gas supplied by the Company are to be of either of the most improved forms prescribed by the Gas-Works Clauses Act, 1871, as may be selected by the Gas Examiner. Looking at the case all round, it is not surprising the Company scored such a big and gratifying success.

The whole of Wednesday's sitting and Thursday afternoon were devoted by the Committee to the consideration of the clauses of the measures of which they had approved. In the first place, there was a superfluity of discussion regarding the form the clauses of the Bill should take which is to regulate the charges for prepayment meters and fittings in the Metropolis. Antagonism and frivolous obstinacy on the part of the London County Council had prevented an agreement with the Companies as to the phraseology and compass of the clauses; and therefore the Committee found themselves called upon to arbitrate between two sets—one by the County Council, and the other by the Gas Companies collectively. The Committee, it will be remembered, had on the previous Friday determined that the maximum additional charge for prepayment meters and fittings in the Metropolis should be 10d. per 1000 cubic feet, and that the remnant of the County Council Bill should be the channel by which legislative effect should be given to this decision. The modest little measure which has left the Committee room will never in future be identified with the Bill which was sent forth from Spring Gardens to shackle the London Gas Companies. Nothing now remains of the original but a small portion of the preamble, and the ponderous face title "The Gaslight and Coke, Commercial Gas, and South Metropolitan Gas Companies Bill." Even this is only being retained for purposes of identification in its remaining stages through Parliament, and ultimately it will be styled and known as the "Metropolis Gas (Prepayment Meter) Act, 1900." The result of the discussion on Wednesday morning (which is reported at length elsewhere) can be very briefly told. The form of clauses presented by the Companies was preferred by the Committee; and so from beginning to end, the representatives of the County Council had to bear the humiliation of seeing their proposals set aside in favour of the Companies whom they had sought to bind. Shortly, then, the Bill as it now stands provides that the price to be charged for gas under the prepayment system is not to be more than that charged to ordinary consumers; that the maximum sum to be charged in excess of the price of gas for the hire of the prepayment meters and fittings is to be at the rate of 10d. per 1000 cubic feet; and that the Companies are, in collecting money for gas supplied by means of prepayment meters, to give a receipt for the same in a form which shall show clearly the rate per 1000 cubic feet charged for gas, and in addition, the rate in respect of meters and fittings charged therewith. The maximum charge for the hire of a prepayment meter without fittings is to be at the rate of 10 per cent. on the cost of the meter. Provision is also made for the revision of the rate of charge by an arbitrator to be appointed by the Board of Trade.

In the history of the Metropolitan Gas Supply, there is more than one instance of Parliament having reposed unbounded faith in Mr. George Livesey; and he has justified the trust. Through Mr. Oldroyd's Committee, the House of Commons have again shown their confidence in him by passing the South Metropolitan Company's Bill, the progress of which through the Committee up to the point where the preamble was declared proved was recorded last week. The Committee, in making their announcement, it will be remembered, objected to what the Chairman termed the "floating standard" contemplated by the Bill, and suggested that the illuminating power should be 14 candles and the initial price 3s. 1d. per 1000 cubic feet. If this had been a hard-and-fast decision, instead of merely a suggestion, the Company, under their present circumstances, would have been compelled to withdraw the Bill; but Wednesday's proceedings showed that the suggestion was merely a proposed basis on which the Committee and the promoters could discuss a means of overcoming the objection of the former to the "floating" standard. By the exercise of some little diplomacy by Mr. Livesey on the one side and by the Committee on the other, an arrangement has been effected by which the Company are to be let down to the mentioned low standards of illuminating power and price in two steps; and so the Bill has been saved. The piloting of the measure past the shoals and reefs that have beset its course thus far has been a difficult matter; but it has been accomplished. And if it now succeeds in safely

completing its voyage through the parliamentary seas, its passage will be a triumph for the cause of cheap and rational gas supply.

When the Bill came up for the consideration of the clauses on Wednesday, it was feared by many that its career would be rapidly closed. But such an eventuality, it was quickly apparent, was foreign to the minds of the Committee, who were as anxious as its author to see this scheme for the reformation of part of the London gas supply go through; and, before Lord Robert Cecil had finished explaining the necessity for a transition period, the Chairman mentioned that the same thing had occurred to him after he had delivered the Committee's decision the previous Friday. Lord Robert showed that, having made their contracts for coal to produce 16-candle gas, to comply with the Committee's suggestion at the beginning of the half year following the passing of the Bill, would impose a serious loss on the Company. He therefore submitted that the proposal in the Bill should stand, with an addendum to the effect that whenever, under the provisions of the Act, the standard price of gas was reduced, it should not thereafter be raised. The original proposal was that the standard price should vary according to the illuminating power of the gas as follows: 3s. 3d. (which is 3d. less than the present standard) for gas having the power of 16 candles or more, 3s. 2d. for gas of 15 and under 16 candle power, and 3s. 1d. for gas of 14 and under 15 candle power. When the Bill was drafted, the promoters had no idea that the price of coal was going to rise to the extent it has done; and Mr. Livesey was called to show what effect this would have. The Company have bought coal at 8s. per ton advance; and on the 1,100,000 tons they carbonize in a year, the increased price will add £440,000 to their expenses. Reckoning that they will obtain a return of £100,000 from coke, this will leave £340,000 to make up. A 1d. increase per 1000 cubic feet gives the Company £42,000; so that 2s. 8d. is the lowest price at which they can, under present circumstances, hope to supply gas. By further calculations, Mr. Livesey showed the Committee that, by reducing under these conditions the initial price to the 14-candle standard, the proprietors would receive only 3¼ per cent. at the market price of the stock. Therefore, he urged, the only way out of the difficulty was to come down by steps; but at the same time he made it quite clear that he did not withdraw in the slightest degree from his position as to the necessity for abolishing enrichment.

Considerable argument ensued between the Chairman, Mr. Livesey, and Lord Robert Cecil, in the course of which Mr. Livesey frankly confessed that, in introducing the Bill, the Company had been too keen to fall in with the recommendations of the Select Committee of last year; and that they were giving more to the consumers than they would save. The Committee were obdurate on the point of leaving the reduction of the standards to the will of the Company; but at the same time they were equally as desirous as Mr. Livesey to get the Bill through. It was the Chairman's idea that there should be fixed periods within which the reductions should take place; and, after one or two short-period proposals, he suggested that the Company should descend by commencing the supply of 15-candle gas on July 1, 1901, and 14-candle gas on July 1, 1903. Even this Mr. Livesey would not take the responsibility of accepting; but the time for the midday adjournment having about arrived, he obtained the permission of the Chairman to consult his colleagues, who were holding their usual Board meeting at the Company's chief offices. True to his engagement in regard to time, Mr. Livesey returned with the intelligence that the Directors were prepared to accept a time-limit if the imposition of the 14-candle power standard was postponed until four years after the commencement of the 15-candle standard on July 1, 1901, with a promise to reduce it sooner if at all possible. He explained that, to effect savings, the system of manufacture would have to be altered; and the Company could only make the necessary changes as carbonizing plant became worn out. The proposal was a reasonable one; but, after what had already transpired during the morning, nearly everybody present was astonished at the ready acquiescence of the Committee. For the lower quality gas, the conditions of testing and the penalties are to remain as at present. A three months' notice of a reduction of illuminating power is to be given to the County Council and the Local Authorities, and also to the consumers by advertisement. The consumers are to have two years from July 1, 1901, in which to apply for the new burner (designed for the lower quality gas) as promised by Mr. Livesey, and to which reference was made last week.

The County Council have reserved the right to oppose the Bill on one or two points in the House of Lords; and a leading official of that pugnacious body promises another attack on the Gas Companies next session. This official has informed Mr. Livesey that the Council intend to again introduce their Portable Photometer Bill. Mr. Oldroyd, however, while he cannot control future legislation, has stated that, in dealing with the South Metropolitan Bill, they have proceeded upon the basis that the testing would remain the same as now. To this statement due regard will certainly be paid by any Committee who may be inflicted next session with the task of considering the reactionary proposal for random photometry.

The question of the protection of property owners in the neighbourhood of gas residual works was raised in connection with the Salford Corporation Bill, which was last week before a House of Lords Committee presided over by Lord Newton. The Corporation wish to carry on the manufacture and conversion of residuals upon certain land owned by them near the Manchester Ship Canal, part of which is at present leased to Mr. Lord for the same purpose. Mr. Lord purchases the tar from the Corporation under a seven years' agreement; and at the end of the contract, the works may be taken over at a valuation. The petitioners were Messrs. W. Brown and Son, who own cottage property in the neighbourhood. It was proved that up to now they had made no complaint of nuisance arising from Mr. Lord's works; but they alleged they had suffered injury, and asked for protection. Weighty testimony was given by Mr. Herbert Parker, a Local Government Board Inspector, who stated that he had from time to time visited Mr. Lord's works, and had never had cause to complain of nuisance. This evidence and that of several other witnesses (among them Mr. Alfred Colson) convinced their Lordships that there was no necessity to insert a protective clause.

The Bill promoted by the Walker and Wallsend Union Gas Company to enable them to supply electricity within the borough of Jarrow and the urban district of Hebburn, and to raise additional capital, was last Thursday before Mr. J. W. Lowther's Committee. The Bill was unopposed; and the necessary proofs having been submitted, it was ordered to be reported to the House.

## HOUSE OF LORDS.

The following further progress was made with Private Bills last week:—

Bill read the first time and referred to the Examiners: East London Water Bill.

Bills read a second time and committed: Bedford Gas Bill, Woodbridge District Water Bill.

Bills reported: Maidenhead Gas Bill, Southport Water Bill.

Bill reported, with amendments: Westgate and Birchington Water Bill.

Bills read the third time and passed: Barnsley Corporation Bill, Glastonbury Corporation Gas Bill, Rotherham Corporation Bill.

Bills Royal Assented: Grantham Gas Bill, Kingston-upon-Thames Gas Bill, Newport (Mon.) Gas Bill, Redhill Gas Bill, Rugeley Gas Bill, Wetherby District Water Bill.

The Morecambe Urban District Council (Gas) Bill and the Water Orders Confirmation Bill were referred to a Select Committee, consisting of Lord Fermanagh (Chairman), Lord Bagot, Lord Carysfort, Lord Erskine, and Lord Muncaster; to meet on Tuesday, June 19.

A petition was presented against the Water Orders Confirmation Bill, from owners, &c., in Sunningdale and Windlesham.

## HOUSE OF COMMONS.

### Friday, May 25.

#### THE SUPPLY OF CARBURETTED WATER GAS.

Mr. Steadman asked the President of the Board of Trade whether there was any legislative regulation or restriction in regard to the use of and supply by the London Gas Companies of carburetted water gas; whether he was aware that in 1898 a Departmental Committee appointed by the Board of Trade recommended that the admixture of water gas with ordinary coal gas should be limited to 12 per cent., and that, by a Parliamentary Return in the same year, it was shown that some of the London Companies were even then using considerably over double that proportion; and whether, in view of the fact that there was reason to believe the amount had since been largely increased, and that water gas was four times as poisonous as coal gas, and could not be detected by its odour, he would consider the advisability of taking steps to initiate legislation on the subject, as had long been urged by medical and sanitary authorities, and by some means acquaint the public with the fact that they were being supplied with a poisonous article in the name of ordinary gas, so that due care might be taken in its general use.

Mr. Ritchie: The honourable member must not assume that I admit to the full the accuracy of all the statements contained in the question, some of which might be made the subject of argument and controversy; but the answer to the first paragraph is in the negative. With regard to legislation, I can merely say that, if undertaken, it should be general in its character, and not confined to London. In any general legislation, my right honourable friends the Secretary of State for the Home Department and the President of the Local Government Board would probably have a larger interest than the Board of Trade; and I cannot make any promise on the subject at this period of the session.

The following further progress was made with Private Bills last week:—

Lords Bill read the first time and referred to the Examiners: Gas and Water Orders Confirmation Bill.

Bills reported, with amendments: British Gaslight Company (Staffordshire Potteries) Bill, Exmouth Urban District Water Bill [Lords], Gaslight and Coke, Commercial Gas, and South Metropolitan Gas Companies Bill, Great Berkhampstead Water Bill [Lords], Lambeth Water Bill, Menstone Water (Transfer) Bill [Lords], Mid-Kent Water Bill, Motherwell Water Bill [Lords], Newtown and Llanllwchaiarn Urban District Gas Bill [Lords], Paignton Urban District Water Bill [Lords], Portland Urban District Council (Gas) Bill, Rickmansworth and Uxbridge Valley Water Bill, South Metropolitan Gas Bill, Wandsworth and Putney Gas Bill.

Bills read the third time and passed: Cleethorpes Gas Bill [Lords], East London Water Bill, Higham Ferrers Water Bill [Lords], Kingston-upon-Thames Gas Bill [Lords], Otley Urban District Council Water Bill [Lords].

The East Stirlingshire Water Bill, the Falkirk and District Water Bill, and the Hemel Hempstead Corporation (Water) Bill were referred to a Select Committee, consisting of Colonel Gunter (Chairman), Mr. H. E. Kearley, Mr. Souttar, and Mr. Pike Pease; to meet on Tuesday, June 19.

Two notices in regard to the export of coal stand upon the paper. Mr. Harwood (Bolton) purposes moving "That it is expedient that a duty be levied upon the coal exported from the United Kingdom," and Mr. D. A. Thomas (Merthyr Tydfil) will move, as an amendment, "That in the opinion of this House it would be inexpedient to revive in any form the export duty on coal until a full inquiry has been made into the coal resources of the United Kingdom; and that such inquiry should be instituted forthwith."

**Fatality at the Ashton Gas-Works.**—An inquest was held last Wednesday by Mr. J. F. Price, County Coroner, touching the death of John William Cheetham, a labourer, 36 years of age, who had lately been employed by Messrs. R. & J. Dempster at the Ashton Gas-Works. A man named Caldwell said that on the 16th inst. he was working on a scaffold about 35 feet from the ground, and was engaged in hoisting buckets of mortar by means of a pulley. The rope became fast, and caused a bucket to slip; and deceased, who was working below, was hit on the head. A doctor was summoned, and Cheetham was removed to the Infirmary. He was found to be suffering from a fractured skull, and was operated upon, but death took place on Sunday. The Jury returned a verdict of "Accidental death."

## HOUSE OF COMMONS COMMITTEE.

### Wednesday, May 23.

(*Before Mr.* OLDROYD, *Chairman, Mr.* EMMOTT, *Mr.* NICOL, *and Mr.* STANLEY LEIGHTON.)

THE GASLIGHT AND COKE, COMMERCIAL GAS, AND SOUTH METROPOLITAN GAS COMPANIES BILL.

The Committee this morning proceeded to the consideration of the clauses of the above Bill.

Mr. WORSLEY TAYLOR, Q.C., Mr. TALBOT, and Mr. B. WILKINSON, appeared for the County Council. The other Counsel engaged were: Mr. LITTLER, Q.C., and Mr. H. A. RIGG, for the Corporation of the City of London; Mr. POPE, Q.C., Mr. CLAUDE BAGGALLAY, Q.C., Mr. DANCKWERTS, Q.C., and Mr. R. J. NEVILLE, for the Gaslight and Coke Company; Mr. LITTLER, Q.C., Mr. BAGGALLAY, Q.C., and Mr. SNAGGE, for the Commercial Gas Company; and Mr. BALFOUR BROWNE, Q.C., Lord ROBERT CECIL, Q.C., and Mr. L. W. S. ROSTRON, for the South Metropolitan Gas Company.

Mr. CRIPPS (Parliamentary Agent to the London County Council) said he proposed to read the Bill as amended by the Council to meet the decision of the Committee.

Mr. DANCKWERTS understood the Committee had said that the Companies were to be at liberty to propose a form of clauses to carry out the decision of the Committee. The Companies had prepared such clauses; and he asked the Committee to consider them as alternative to the proposed clauses of the County Council, and not merely by way of amendment of the clauses the Council put forward. The Companies had, as it were, re-drafted the County Council Bill. If the proposals of the Companies were considered on their merits, he was confident the Committee would see that the Companies had more than loyally, even liberally, attempted to put into shape the decisions of the Committee.

The CHAIRMAN said the Committee would consider both sets of clauses.

Mr. BAGGALLAY, on behalf of the Commercial Company, stood by what Mr. Danckwerts said.

Mr. TALBOT assumed that the ordinary procedure would be followed—viz., that the promoters would bring up the clauses, and the opponents direct attention to any defects they might think existed.

Mr. CRIPPS said, as the County Council proposed, the Bill would read—

A Bill for making further provision as to testing the illuminating power of gas supplied by the Gaslight and Coke, the South Metropolitan Gas, and the Commercial Gas Companies in the Administrative County of London, and for regulating the supply by those Companies of prepayment meters and fittings in connection therewith; and for other purposes.

Whereas the greater part of the Administrative County of London is supplied with gas by the Gaslight and Coke Company, the South Metropolitan Gas Company, and the Commercial Gas Company in their respective districts:

And whereas the price which the said Companies may charge for gas is regulated under the provisions of divers Acts of Parliament:

And whereas a system has been widely adopted by the said Companies by which prepayment meters and other fittings are supplied by the Companies to consumers, and the consumers so supplied pay from time to time to the Companies sums which include both the price of gas and a charge in respect of the supply of such meters and other fittings:

And whereas it is expedient that the charges to be made by the Companies in respect of gas supplied by means of such meters and fittings should be regulated, and the amount of such charges stated to the persons who pay them:

And whereas the objects of this Act cannot be attained without the authority of Parliament:

May it therefore please your Majesty

That it may be enacted, and be it enacted by the Queen's Most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal and Commons in this present Parliament assembled, and by the authority of the same as follows:—

The CHAIRMAN: Do you concur as regards the preamble?

Mr. DANCKWERTS: We leave out the whole of the preamble until we reach the part of it which the Committee amended, on the ground that the whole of it is needless and simply overloading the Bill.

The CHAIRMAN: We had better have the form of the promoters. It is a recapitulation of fact and of the experience upon which legislation has proceeded. We will accept the proposal as read by the promoters.

Mr. DANCKWERTS remarked that the title of the Bill had not been amended.

Mr. CRIPPS said this could not be done till a later stage.

The CHAIRMAN said the title had always seemed ridiculous.

Mr. BAGGALLAY agreed that they could not alter the title at present; but the short title in the clause could be altered.

After further discussion, it was agreed that clause 1 should read:—

This Act may be cited for all purposes as "The Metropolis Gas (Prepayment Meter) Act, 1900."

Clause 2 was accepted by the Committee in the following form:—

In this Act, "the Council" means the London County Council; "the Corporation" means the Mayor, Commonalty, and Citizens of the City of London; the expression "the Companies" means the Gaslight and Coke Company, the Commercial Gas Company, and the South Metropolitan Gas Company; and the expression "the Company" means each of the said Companies; the word "fittings" means pipes, burners, stoves, and other fittings used in connection with the consumption of gas supplied by means of prepayment meters; the expression "prepayment meter" means any meter or appliance by which the quantity of gas supplied is regulated according to the amount of money prepaid therefor.

Mr. DANCKWERTS, in order to guard against a new kind of meter being invented in which there could be prepayment otherwise than by a penny in the slot, sought to place the word "automatically" before the word "regulated," at the end of the clause; but the CHAIRMAN took exception to the word, and it was accordingly not added.

Mr. CRIPPS said the first new clause he proposed was 2a. The first sub-section was as follows:—

With respect to the supply of gas by means of prepayment meters, the following provisions shall have effect (that is to say):—(1) The price to be charged by each of the Companies for such supply shall be after the same rate as the price charged per 1000 cubic feet to consumers supplied by such Company by ordinary meters, together with an additional charge at a rate not exceeding 10d. per 1000 cubic feet consumed in respect of the cost incurred by such Company for, and in relation to, the providing, letting, fixing, repairing, and maintaining of meters and fittings connected therewith, cost of collection, inspection, and any other extra cost incurred by the Company incident to such supply.

Mr. DANCKWERTS objected to the clause, because it was not very clear as to the price the consumer was to pay for fittings. The proposals of the Companies were—

3.—The Companies respectively shall not be entitled to charge, or charge, for any gas supplied through a prepayment meter any greater charge, rate, or rent than the Companies are respectively entitled by law to charge for gas supplied through any other kind of meter, or by any other method of supply.

This was short, and very plain.

4.—The Companies shall not be entitled to charge, or charge, for the hire of any prepayment meter and fittings to be used therewith any sum other than a sum of money calculated according to the quantity of gas supplied through such prepayment meter; and the maximum sum to be so charged shall be at the rate of 10d. per 1000 cubic feet, supplied in manner aforesaid, such sum to include the hire of one meter and the fittings used therewith.

This was also very plain. The sixth clause carried out the other decision of the Committee—

6.—The Companies shall, in every contract relating to the hire of prepayment meters and fittings to be used therewith, and in every receipt for such hire, state separately and distinctly the charges respectively made for the gas and for the hire of such meters and fittings.

Mr. TALBOT said this dealt with the same thing as paragraph 3 of his clause. It should come later.

The CHAIRMAN: Let us go through the proposed clause 2a.

Mr. CRIPPS said the second and third paragraphs in the County Council's new clause were—

2.—The index of the prepayment meter shall be *primâ facie* evidence of the quantity of gas consumed; and on that quantity the collector shall make the charge for gas. Any excess in the value of the coins found in the meter shall be returned to the consumer; and any deficiency in value shall be paid by him. In the event of the consumer refusing to pay such deficiency on demand, the Company may discontinue the supply of gas and remove the meter and fittings, and may recover such deficiency in any manner in which the rents or sums due to the Company for gas are recoverable.

3.—The Company shall, in collecting any money for gas supplied by means of prepayment meters, give a receipt for the same in a form which shall show clearly the sum per 1000 cubic feet charged for gas, and in addition the extra sum in respect of meters and fittings charged therewith under this Act; and the total receipts for such extra sums shall be shown in the Company's accounts in manner prescribed by the Official Auditor appointed by the Board of Trade.

Mr. DANCKWERTS: The last part is already existing law.

Mr. CRIPPS said that their clause 2b was—

If at any time after the expiration of seven years from the passing of this Act, the Council or the Company make a representation to the Board of Trade to the effect that the maximum charge to be made in respect of prepayment meters and fittings under this Act ought to be altered, the Board of Trade, after such inquiry as they may think fit, may make an order varying such maximum charge, and such maximum charge shall from and after such day as may be mentioned in the order be deemed to be substituted for the maximum charge prescribed by this Act. Provided that such charge may be altered in like manner after the expiration of any or every period of seven years after any alteration under this section.

The adoption of this would involve the omission from the Bill of clauses 3 to 15 inclusive.

Mr. DANCKWERTS said his two clauses were very plain. He had read clause 6. As to clause 7, there had been a doubt whether some of the Gas Acts applied to prepayment meters. Therefore they proposed—

7.—Prepayment meters shall be deemed to be within the provisions of the Sale of Gas Act, 1859.

Clause 8 would enable the consumer to demand prepayment meters without fittings.

8.—The maximum charge for the hire of a prepayment meter without fittings shall be at the rate of 10 per centum per annum on the cost of the meter to the Companies respectively; and the Companies' Acts respectively applicable to ordinary meters, shall apply within the Companies' respective districts to prepayment meters.

In this case, the safeguards in favour of the consumer were incorporated. Clause 5 was the inquiry section. It was intended to meet the objection of Sir Courtenay Boyle to the Board of Trade being called upon to fix the rate. It was as follows:—

5.—The rate fixed by the last preceding section shall be open to revision by the Board of Trade in manner following (that is to say):—If at any time after the expiration of seven years from the date of this Act, or any inquiry under this Act, any of the Companies, or the Council, or the Corporation request the Board of Trade in writing to revise the said rate, the Board of Trade shall appoint a competent and impartial arbitrator, who shall hold an inquiry and fix a rate to be substituted aforesaid: Provided that the Board of Trade may at any time, if they think fit, at such request put into operation the provisions of this section. At least twenty-eight days before the holding any inquiry under this Act, the Board of Trade shall give to each of the Companies, to the Council, and to the Corporation notice of such inquiry, and of the time and place thereof; and each of the Companies, the Council, and the Corporation shall be entitled to attend and to be heard at such inquiry.

Under this, if a new kind of meter or fitting, which might be cheaper than the existing one, were invented, it could be adopted. This was the original County Council section. He submitted that the clauses the Companies proposed carried out the decision of the Committee in a very simple way.

Mr. TALBOT said his clients did not think that the incorporation of the Sale of Gas Act, 1859, was necessary; but, to clear up any doubt, they were prepared to accept the proposal.

Mr. DANCKWERTS said he had not himself thought it necessary; but the section had been prepared to satisfy Sir Courtenay Boyle.

The CHAIRMAN: The Committee are of opinion that the clauses submitted by the Companies are clearer—meeting a greater variety of cases, and the possible invention of a new class of meter. The ground is pre-

pared; and we should propose to accept these provisions, unless Counsel have something to say against them.

Mr. TALBOT said that, taking the thing as a whole, they had no objection to the general scheme as proposed by the Companies. On one or two points of detail, he would suggest they should be improved. As to the words of clause 4 as proposed, it appeared to him that they were unduly narrow as compared with the South Metropolitan clause which his clients had adopted. Their proposal was to make the whole charge incurred—gas used, meter, fittings, cost of collecting, and all the other things in the words of the South Metropolitan clause—incident to the supply. What was desirable, and what was the wish of the Committee, was that there should be a charge to include everything. Anything that left the matter open for a special contract between the Company and the consumer, might be objectionable.

Mr. DANCKWERTS said that they might have added, at the end of clause 4, the words:

The said charge shall include the providing, letting, fixing, repairing, and maintenance of the meter and fittings, and the cost of collection, inspection, and every other cost included by the Company in connection with the meter and fittings.

Mr. TALBOT said he agreed with that. He did not know whether there was any substantial objection to his revision clause. They proposed to leave it to the Board of Trade to decide the matter, after an inquiry. The Companies proposed that the Board of Trade should be specifically directed to appoint a competent and impartial person which, presumably, they did.

The CHAIRMAN: The proposal of the Companies would better meet the feeling and disposition of the Board of Trade. They do not wish themselves to interfere in the matter. I have just consulted with my colleagues; and they quite think they would be disposed to appoint an arbitrator.

Mr. TALBOT: There will be an inquiry by having an impartial man. If it is desired to put it in that way, I shall not object.

Mr. DANCKWERTS: We have proposed this in order to meet Sir Courtenay Boyle's objection.

The CHAIRMAN: On the lines of the Official Auditor. He is not an official of the Board of Trade, but acts under their authority, and has a warrant for his appointment.

Mr. DANCKWERTS: We propose that in the clause which states that the Board of Trade shall appoint a competent and impartial arbitrator, who shall hold an inquiry, after the word "inquiry" we should add "and fix the maximum rate." We should have no objection to that.

Mr. TALBOT submitted that the arrangement they had proposed was preferable. It was unnecessarily cumbrous to require a special contract in each case; and they would provide that the Companies might be required, when they collected the money, to give a receipt in writing. They proposed that this information should be embodied in the receipt.

Mr. DANCKWERTS said it was for the Committee to decide that point.

Mr. TALBOT said that, in some respects, a formal contract followed by a receipt was more elegant; but practically a receipt at recurring periods would give the consumer all the information he wanted, and would obviate the necessity of giving a formal receipt in every case.

The CHAIRMAN: As to "contract" in the first line of the Company's clause 6. There is no "contract" is there? Perhaps Mr. Livesey can tell us that.

Lord R. CECIL: We do give contracts.

Mr. DANCKWERTS: The South Metropolitan Company do as a rule; and the Gaslight and Coke Company do also under some of their Acts.

Mr. TALBOT said that if the Companies chose to put themselves under the burden, his clients would have no objection; but they thought there should be a receipt on each occasion showing all the particulars.

Mr. DANCKWERTS proposed that in his clause 6 they should adopt the words "the Company shall give a receipt for any money paid in respect of gas supplied."

Mr. TALBOT said that in the third paragraph of his clause 2A the words were "shall show clearly the sum per 1000." Mr. Livesey preferred the word "rate," in place of "sum."

Mr. DANCKWERTS said that his learned friend's clause should stop at the words "charged therewith under this Act." The Auditor of the Board of Trade already had larger powers than would be given by the clause; and the words proposed would cut down those powers.

Mr. TALBOT: I am told that is not so.

The CHAIRMAN: In place of clause 6, we will take clause 3 of the promoters as amended; and it will read as follows:—

The Company shall, in collecting any money for gas supplied by means of prepayment meters, give a receipt for the same in a form which shall show clearly the rate per 1000 cubic feet charged for gas, and in addition the rate in respect of meters and fittings charged therewith under this Act.

Clauses 7 and 8 were then agreed to as follows:—

7.—Prepayment meters shall be deemed to be within the provisions of the Sale of Gas Act, 1859, provided that the periods which, according to the said Act, are to be calculated from the date of its passing, shall, for the purposes of this section, be calculated from the passing of this Act.

8.—The maximum charge for the hire of a prepayment meter without fittings shall be at the rate of 10 per centum per annum on the cost of the meter to the Companies respectively; and the Companies' Acts respectively applicable to ordinary meters shall, so far as applicable, apply within the Companies' respective districts to prepayment meters.

The last clause adopted was as follows:—

The costs, charges, and expenses preliminary to and of, and incidental to, the preparing, applying for, obtaining, and passing of this Act shall be defrayed as payments for general county purposes within the meaning of the Local Government Act, 1888.

The Bill, as amended, was then ordered to be reported to the House.

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The Sunlight (Acetylene) Gas Company, Limited, of Dublin, have recently carried out the public lighting of Dunfanaghy (Co. Donegal), and have contracted with the Gort District Council to light the town. Gort has a population of about 1500; and at present has no light of any kind. In addition to 32 public lamps, it is proposed to supply private consumers from the same pipes.

## HOUSE OF COMMONS COMMITTEE.

### Wednesday, May 23.

(*Before Mr.* MARK OLDROYD, *Chairman, Mr.* EMMOTT, *Mr.* NICOL, *and Mr.* STANLEY LEIGHTON.)

### SOUTH METROPOLITAN GAS BILL.

To-day the Committee proceeded to deal with the alterations in the above Bill required to carry out their decision.

Mr. BALFOUR BROWNE, Q.C., Lord ROBERT CECIL, Q.C., and Mr. ROSTRON were for the promoters. The other Counsel engaged were: Mr. F. R. FITZGERALD, for the Ecclesiastical Commissioners; Mr. FREEMAN, Q.C., and Mr. G. J. TALBOT, for the Vestries of Camberwell, Rotherhithe, Battersea, Bermondsey, and Newington; Mr. WORSLEY TAYLOR, Q.C., Mr. FREEMAN, Q.C., and Mr. G. J. TALBOT, for the London County Council; Mr. CORRIE GRANT, for the Vestry of St. George, Southwark; and Mr. LITTLER, Q.C., and Mr. RIGG, for the Corporation of the City of London.

Lord R. CECIL: I think it will be most convenient that I should explain what alterations have been made in the Bill in deference to your decision; and then we will go through the clauses. I am not quite sure that the Bill before you is accurately altered. That is a difficulty. You asked that in the preamble the word "standard" should be inserted before "illuminating power." This, of course, we have done, or it shall be done; and the preamble will read: "And whereas it is expedient to alter the standard illuminating power of the gas supplied by the Company and the standard price to be charged therefor, and also to alter the variation of dividend dependent on the increase or decrease of such standard price as provided for by the Act of 1896." Now as to the remainder of the alteration that you suggested, I should like you to leave that over till I have said what I have to say about the alteration we propose in order to meet the rest of the Committee's decision. We shall, of course, do our best to carry out the decision of the Committee; but if we were to abolish the 16-candle standard and the 15-candle standard to-morrow, the Company would be put in this difficulty: They have ordered a large supply of coal from Yorkshire, which gives them at present rather a higher standard, I think, even than 16 candles. They have had to do it owing to the great rise in the price of coal in the North. If they were compelled to bring their standard down to 14 candles instantly and their initial price 2d., this would mean a very serious loss to the Company, because they have made all their preparations; and although they fully recognize the desirability of eventually reaching a fixed and not a fluctuating standard, they hope that the Committee will allow them to proceed by steps, and not by a jump. I am going to call Mr. Livesey, because it is a matter of very great importance; and he will explain in detail what the proposal is. We propose to deal with clause 5, which is the operative part of the Bill. We should propose to leave clause 5 in as it was drafted: "From and after the first day of July or the first day of January, whichever shall first occur after the passing of this Act, the standard price of gas supplied by the Company shall vary according to the illuminating power of such gas, and shall be as follows (that is to say): 3s. 3d. for gas having the power of 16 or more candles; 3s. 2d. for gas having the power of 15 candles and under 16 candles; and 3s. 1d. for gas having the power of 14 candles and under 15 candles;" and then add: "Provided that, whenever under the provisions of this Act the standard price is reduced, it shall not be thereafter raised." That is to say, we are going to reduce, as soon as we can commercially do it; but it will give us a little time to turn round in, subject to this—that there will never be a floating standard. Once we agree to take the standard price below 3s. 3d., we shall have to keep it below, in the same way as once we get below 3s. 2d. we shall have to keep it below. As soon as we can reduce it to 3s. 3d., then we shall not be able to raise it again. That I hope will meet the difficulty the Committee felt about a floating standard, and at the same time will make it practically possible without great loss.

The CHAIRMAN: You are merely attempting to provide for a transition period?

Lord R. CECIL: Precisely.

The CHAIRMAN: That did occur to my mind after we left the room on Friday; and I was wondering whether you could insert a later date, and continue the supply of gas of 16 candles up to that date, and then go down to 14 candles.

Mr. RIGG said they were in a very difficult position in the City, having regard to the decision of the Committee that the illuminating power was to be 14 candles. This was very important, and affected the Corporation, as a public authority, in regard to the price of gas. Now the Committee were asked to go back upon that decision—to say in certain cases they would allow the illuminating power to be 16 candles, and so on, and to hear evidence and alter their decision on the preamble.

The CHAIRMAN: No; I submit that this is not an alteration of our decision. Our decision was that it would never do to have a floating standard—that is to say, a standard to be fixed after the event—testings to be taken, and according to the testings the candle power to be declared at a later stage. This we objected to; but, as practical men, we quite see that you cannot jump from 16-candle power to 14-candle power, without some transition period, and some of the Committee, I know, have in the interval been considering what would be the best form to adopt. Some of us thought that perhaps a six months' later date than that now in the Bill would give the Company time to work off their present stock of coal without disadvantage to themselves. Of course, we do not wish to impose any disadvantage on the Company in adapting themselves to the new methods.

Mr. TALBOT: I may say we suggested that.

Lord R. CECIL: I am advised by Mr. Livesey that this is the best means of carrying out the decision.

The CHAIRMAN: On this clause, as a matter of detail, we shall be glad to hear Mr. Livesey.

Mr. *George Livesey*, re-called.

Lord R. CECIL: I want you to explain to the Committee the difficulty you have felt in carrying out the decision so as to reduce the standard immediately from 16 to 14 candles without any provision for the transition period?

*Witness:* I am afraid I must go into a rather long explanation. When we thought of promoting this Bill last year, with the idea of carrying out the suggestion of last year's Committee, and to get this necessary alteration in the quality of the gas, it was the farthest thing from our thoughts that the price of coal would ever go up again as it did in 1873. We were selling gas at 2s. 1d.; and I said to my people, over and over again, that the margin of 5d. up to 2s. 6d. was the outside that we could ever expect to have to raise our price to. At 2s. 6d., the dividend to our shareholders would have been the same under Sir James Rankin's recommendation as under our old sliding-scale of £5 4s. per cent. That was our view even in February last, at our shareholders' meeting; and when we explained the Bill at the Wharncliffe meeting, we put that before them—that they would be no worse off, under any circumstances, than they were then. But since February, the price of coal has gone up so enormously that we have bought at 8s. a ton advance; and that advance in the price of coal will necessitate in the next half year our increasing the price to 2s. 8d. per 1000 cubic feet at least—2s. 8d. per 1000 cubic feet I am certain it must be. I may put it in this way: On our 1,100,000 tons in the year, that will add £440,000 to our expenses; we shall not get £100,000 back out of our coke. This would leave us with £340,000 to make up; and reckoning £42,000 per penny, it comes to an increase of 8d. over our 2s. 1d. This would bring us to 2s. 9d.; and I am within the mark when I say 2s. 8d. is the lowest price at which we could hope to supply gas. At 2s. 8d. per 1000 cubic feet, if we were immediately to adopt the 14-candle power gas, our shareholders (under the present system they are entitled to 5 per cent.) ——

The CHAIRMAN: At 2s. 8d.?

*Witness:* Yes; but they would be entitled then to only £4 13s. 4d. They are now getting £5 6s. 8d.; and they were entitled last year to £5 14s. 4d. I persuaded them to forego the 7s. 4d., which is £20,000 a year, in order to help to reduce the price. Well, you will say it is not a serious matter to reduce from £5 6s. 8d. to £4 13s. 4d.; but there is something peculiar about our shareholders. Since 1890, we have issued all our stock in small amounts to the consumers and employees. They have invested £724,000 in the Company in the last ten years at market price under the auction clauses; and that market price, even at our own highest dividend of £5 6s. 8d., gives them only £3 16s. per cent. To reduce the 5 per cent. dividend, would reduce the interest to 3¾ per cent.; and to reduce the £4 13s. 4d., which we should have to do under the 14-candle standard, would bring their interest down to 3¼ per cent., which, of course, is a very ridiculous figure for a trading business. In issuing the stock to these shareholders, we have adopted the principle that has recently been adopted by the Government and the London County Council in their loans, of fixing the price that was fixed by the auction clauses, saying: "You can have this stock at such a price in amounts of £5 and upwards." We have favoured the small investor; we have limited the amount to about £50. I think in no case has it been more than £70; and thus 3000 or 4000 consumers have taken stock on the faith of this, and are only getting 3¾ per cent., and to come down to 14 candles with the initial price would reduce them to 3¼ per cent. Now, I could not face them. I could not go to them, and say: "We have given away this because, under the old system, you would have had 5 per cent., and under the present one you will only get £4 13s. 4d." Therefore the only way in which we can come down is by steps. I do not know whether I have made myself clear.

Lord R. CECIL: Therefore you say you must come down by steps. You do not wish it to be thought for an instant that you go back from anything you said as to the necessity for abolishing enrichment?

*Witness:* Not a word. I am satisfied that it is the right thing to do.

And you absolutely pledge your Company to abolish enrichment?—Yes. We have bought largely of Yorkshire coal. We got it a little cheaper than Newcastle coal; and this Yorkshire coal gives us nearly 17 candles at present.

That you have been compelled to do, owing to the exceptionally high price of the northern coal?—Yes; so that we cannot perhaps come down to 15 candles immediately.

It has been suggested that your difficulty might be met by fixing a future date in the Bill for the coming into operation of the 14-candle standard and the 3s. 1d. standard price. Will you explain why that is impracticable?—Well, it is not so easy a matter to reduce the quality, as some gentlemen have said, by drawing in air or working the exhauster rather harder. We are quite prepared at once to adopt the suggestion of the Committee that the gas shall be homogeneous. We can immediately knock off the enrichment, which costs us £20,000 a year; but how we are to come down to 14 candles, I do not know at present. If we can get a cheaper supply of coal, we might do it; it will probably be done by an alteration of our system of manufacture, and that will take some years. What I say is, that we will come down from 16 to 15 candles as soon as we possibly can; and we will come down from 15 to 14 candles as soon as we possibly can. But I cannot say when.

You can say this—that once you have come down, you will never go up again?—Certainly.

Is your proposal, then, to put this proviso in clause 5 that has been read to the Committee—that is, to prevent your ever going up again?—Yes.

Subject to that, you propose to keep in force in principle, until you have got down, the proposal as to letting the initial price depend upon the average of your illuminating power?—Yes. In making this proposal, we have been very liberal to the consumers. But we have made it; and we stand by it.

Just let me understand. The original proposal was on an illuminating power average of six months?—Yes.

Owing to objections that were made by the petitioners, did you draft clause 6 (*a*), or cause it to be drafted, which makes it dependent on the average of one month?—That is their own clause; they drafted it.

There is a little error in that clause; 16½ and 16 ought to be 17?—Yes.

You have clause 6A before you. I think it will be convenient if I read it: "For the purpose of determining and regulating the increase and decrease of the dividend of the Company by the increase or decrease of the illuminating power of the gas, the following provision shall have effect: (*a*) The average of all the official testings made in each month of each half year shall be multiplied by the quantity of the gas sold by the Company during such month. (*b*) The figure thus obtained for each of the six months in any half year shall be added together and divided by the total quantity of gas sold by the Company during such half year; and the figure thus obtained shall be deemed to be the illuminating power of the gas for such half year. (*c*) In calculating such average, all testings showing a higher illuminating power than 16½ candles shall be taken as showing 16 candles and testings"—17 candles that ought to be?—That is while we are supplying over 16-candle gas.

"Shall be taken as showing 17 candles; and testings showing a lower illuminating power than 14 candles shall be taken into account in calculating the average. Subject as aforesaid, the provisions now in force with respect to the forfeitures by the Company for defect in illuminating power shall continue of full force and effect when on any day the illuminating power of the gas supplied by the Company is less than 14 candles. (*d*) The Company shall, during the first ten days in each month, inform the London County Council what was the amount of gas sold by the Company during the preceding month." The effect of this will be that, until you get down to 14 candles, or rather until you get down to 15 candles, you will be at 16 necessarily?—If the average quality is what it is now.

You remain at 16?—We remain at 16, as it will remain for some time.

If it falls to 15, your standard price will go down to 3s. 2d.?—If the average falls to 15·99.

And it will never be raised again?—No.

If it falls to 14 candles, it will go down to 3s. 1d.; and then the clause will automatically come to an end, because it can never be raised again, whatever your illuminating power is?—That is so.

Do you think, as a practical man, that this substantially carries out the object, as you understand it, that the Committee have in view? And is it the only practicable way to do so?—It is to my mind the only practicable way; there is no other way.

Unless some provision was made to deal with this transition period, the effect would be that the shareholders would be giving a 15-candle gas for a 14-candle price?—To put it in another way, if we were to accept the 14-candle standard at once, our shareholders would never be in so good a position as they are now until the price was reduced to 1s. 10d. Considering that we are not bound to come to Parliament—we have plenty of capital and everything we want to last us at least seven years—what would my shareholders say?

Mr. LITTLER suggested, in cross-examination, that if the South Metropolitan Company did not supply the Gaslight and Coke Company's area south of the Thames, there would be nothing by which the prices of the two Companies could be compared, because they would not be selling the same article.

*Witness* replied that there would be a fixed relation between the two—1d. difference in the initial price for each candle. If the Gaslight and Coke Company supplied 16-candle gas, and the South Metropolitan Company 15-candle gas, the former Company would be entitled to 1d. per 1000 cubic feet more.

That does not show that the Gaslight and Coke Company are to be entitled to 1d. per 1000 cubic feet more. It simply says what your prices are to be; it does not show that there is to be any relation between them. How are we to insist upon our privileges?—I cannot tell you.

Without doing it formally, you absolutely repeal the privileges which we have by your Bill?—Yes; and very properly.

I am supposing they do not get rid of their southern district?—I beg your pardon; that would be 1d. more than they would be entitled to.

That relation is not established in the Bill?—It could be put in.

Mr. NEVILLE: I do not think this can be put in the Bill. I do not think anything that is put in the South Metropolitan Bill can affect the Gaslight and Coke Company.

Mr. LITTLER: If it cannot, there is an injustice being done in passing this provision.

*Witness:* I do not see the difficulty. I thought you were referring to the public lights difficulty.

The CHAIRMAN: I think the Committee might express an opinion at this juncture. We could not accept this method of testing gas—not even as a temporary method. Therefore the Bill would have to go if that be adhered to. We are quite willing to make provision as far as possible for a temporary intermediate stage. We acknowledge your difficulties, and recognize them. Our suggestion would be that up to the 30th of June, 1901, you should continue to supply 16-candle gas as now. That is twelve months more, practically; then from the 1st of July to the 31st of December, 1901, you should supply 15-candle gas; and from the 1st of January, 1902, you should supply 14-candle gas. You require twelve months for the intermediate stage?

*Witness:* I do not know what time we should require, really. We will get down as fast as we can, and as much as we can; but you cannot tell what would be the price of coal next June.

I do not see that the price of coal affects it at all?—It affects it in this way, that the dividend received by our shareholders ——

But you see that adverse condition of your stockholders arising from your having to put up your standard, does not affect the illuminating power of your gas. It is an incident for which you cannot be held responsible by your shareholders, and which really the Committee cannot take into consideration?—Well, let me say, to reduce from 16 to 15 candles, the only immediate saving we see is the saving of enrichment, which costs us £20,000 a year. We must give up £42,000 in order to place us in the same position; and to reduce from 16 to 14 candles, we must save £84,000 a year somehow—how, I do not know until we have tried.

The CHAIRMAN: That is a matter which you must have considered before you came to the Committee with your proposal.

Lord R. CECIL: Coal has gone up so very exceptionally, that it has put out the whole calculation.

The CHAIRMAN: But the shareholders will be put out by this rise in coal, apart from anything which is enacted in this room.

Lord R. CECIL: But it will greatly increase it if you reduce the initial price.

The CHAIRMAN: Well, that is your proposal. The Committee have not insisted on any reduction in price other than that which was proposed in the Bill; and we accept all those provisions. We went so far as to accept the sliding-scale at 1d. per candle, which was suggested. Therefore you are not mulcted by any action of the Committee. It is your own proposal, if you are in a dilemma.

*Witness:* Only our proposal left it to us to reduce when we could.

But your proposal is too fluctuating. If you feel it is necessary to have

twelve months instead of six months at 15 candles, we should be prepared to grant that?—I really cannot say when we can come down to the 14 candles.

Still, it gives you two years?—Yes; but we must alter our system of manufacture, and that may take five years. It has taken us fifteen years to alter the system of firing from common to regenerative.

By Mr. EMMOTT: He was afraid the shareholders would say he had given them bad justice, and had done more than justice to the consumers and employees.

The CHAIRMAN: I take it you can get down to 14½ or 15 candles; and even if you sold at 15 candles when you were under a standard of 14 candles, you would not lose very much. You can get down by the cessation of enrichment?

*Witness:* But we have to do two things: We have to get down to 14 candles, and to save £84,000 a year to place us in the same position that we are in now.

The opinion is, and has been from the first, that your shareholders would not be quite so well off under the new arrangement as under the old--that in the transition period you will suffer a little while you are taking off your 2 candles?—If I could tell them: "When you get down to the 2s., you will be better off"—but I cannot, at the 14 candles.

Mr. EMMOTT: As a matter of fact, with 2s. 2d. you could pay more than you are paying?

*Witness:* Yes; more than we are paying.

Lord R. CECIL: Would you be prepared to leave the time of the reduction of your initial price and candle power to the Board of Trade. In order to meet what the Chairman has said, you do not feel that you could fix a time yourself; but you are prepared to leave it to an impartial authority to say when that reduction should take place, having regard to the price of the coal?

*Witness:* I think we might do that.

In reply to the CHAIRMAN, who said a very relevant and important matter in the consideration of the Committee was the question of the burners, witness said that when the gas was reduced to 15 candles the Company would supply the burners. It would not be necessary to supply one sort of burner for 15 and another for 14 candle gas. The burner for the 15-candle gas would be specially adapted to 14-candle gas; the margin of inefficiency at 15 candles would not be large.

The CHAIRMAN: Your difficulty does not arrive with the first stage—you could begin with the first stage at once?

*Witness:* As far as stopping the enrichment is concerned; but we have had to buy a large quantity of Yorkshire coal, which gives gas of nearly 17 candles. The public would be getting that; and we cannot reduce the quality of gas until we change the coal.

According to the evidence, the cessation of enrichment would in a large measure account for the 2 candles. Supposing we say it goes halfway—that the one act of cessation would enable you to approximate to 15-candle power. It is very possible, with the extra quality coal you have, you would be supplying 15½ candles, and might even get to 16 candles; but this is no worse than you are to-day, because now you have a 16-candle standard, and according to your test you are very often approaching 17 candles in quality?—Yes.

You would be no further away from your standard, and therefore entail no further loss to your shareholders than you do now, when you practically give ½ to ¾ candle over your standard?—Well, in the first place, enrichment in our case costs about £20,000 a year; and it does not amount to a candle. With the coal we use, we should supply 15½ candles certainly on the average; and we are now supplying 16·3 or 16·4 candles.

There would not be much difference?—No.

Mr. NICOL: To go from 16 to 15 candles, and doing away with enrichment—that is, £20,000 a year. How much more would you lose?

*Witness:* £22,000 more.

That is £42,000 by reducing from 16 to 15 candles?—£42,000. That is 1d. per 1000 cubic feet.

£20,000 of that you get by enrichment?—Yes.

So that you lose, even with coal, £22,000?—Yes.

Surely you considered that before you came here?—Yes; we did. If we could have kept to a 2s. 6d. price, we should not have raised any question about it. We were willing to give the public the benefit. The price must go up to 2s. 8d. or 2s.9d. That is the difficulty in meeting the shareholders.

The CHAIRMAN: But that is a matter which does not arise out of this Bill. It will come upon you and your shareholders, irrespective of legislation?

*Witness:* Yes; and if we had known it, we should not have introduced the Bill at all.

Mr. NICOL: The fact is, you were too keen to fall in with the recommendations of the Select Committee?

*Witness:* Yes; that is the long and the short of it. We have offered more to the consumers than we shall save.

By the CHAIRMAN: He thought the Company could go down to 15 candles by July 1, 1901.

The CHAIRMAN: The Committee are unanimously of opinion that after that we are prepared to give you two years before you go to 14 candles. Therefore, from July 1, 1901, to June 30, 1903, it would be 15 candles; and from July 1, 1903, and onwards, 14 candles?

*Witness:* Yes.

I think this will give you ample time to manipulate the cessation of your enrichment, and to gradually consume all the supply of coal which you now have in stock?—The enrichment we can stop at any time when we have cleared off the enrichment spirit. All I can say is, that I must refer to my Board the question of the 14 candles and the two years.

That does not affect us?—I am not in a position to accept it.

No; but we impose it as a condition. If you do not accept it, of course, there are ways and means of expressing that opinion by withdrawing your Bill?—I should be very sorry, after all this trouble with everybody, to do that.

I think I may say that the Committee also would be sorry. We are anxious to see this through, and should therefore be prepared to adjourn the consideration for a short time, and take up another measure, if, in the meantime, you will consult with your friends?—We have a Board meeting to-day. I will attend the meeting, and then come back.

After a considerable interval,

Lord R. CECIL said: I think we have a solution which will meet the Committee's views. (To witness:) Will you explain what the position is now?

*Witness:* The Board can take a limit of time; but we want a little more than you propose, Sir, and for this reason: The only way in which we see that we can expect to save this £80,000 a year (£20,000 by enrichment and £60,000 otherwise) is by altering our system of manufacture; and this can only be done as the retorts wear out. Our retorts will work for 2000 days—that is, about six years; but we think that if the limit were extended till July 1, 1901, for 15 candles, and four years more for the 14 candles (to do it in less time, if we can), we could fix that. The two years is too short. It would never do for us to pull out retorts (they are most expensive) before they wear out; but as they wear out, we could reset them and entirely remodel our works. The work for this year, let me explain, is already practically done. We cannot begin until next spring.

The CHAIRMAN: You propose to begin with 15-candle power when?

*Witness:* As you suggested, on July 1, 1901.

Mr. EMMOTT: You want four years from then for the 14 candles?

Lord R. CECIL: You desire that from and after July 1, 1901, your candle power shall be 15, and your initial price 3s. 2d.?

*Witness:* Yes.

And that from and after July 1, 1905, your candle power shall be 14, and your initial price 3s. 1d.?—Yes; it will take us quite four years to alter our retorts.

Mr. NICOL: That is a delay of two years beyond the suggestion thrown out by the Committee.

Lord R. CECIL: Yes; and if it is possible to reduce the time, I understand Mr. Livesey to say they will do so.

*Witness:* Yes.

Mr. TALBOT: I only wish to understand it. The effect of this proposal is that the Company would preclude themselves from reducing to 14 candles—from doing that which was the object of the Committee's decision—until 1905.

The CHAIRMAN: No; they do not preclude themselves, but they take that as the maximum limit of time.

Mr. TALBOT: They preclude themselves, if the price is fixed up to 1905.

The CHAIRMAN: Oh, no. Whenever the Company alter their scale they will alter their price; and what the witness is asking is that the maximum of sufferance for 15 candles should extend to June 30, 1905.

Mr. TALBOT: I do not propose to discuss it. I only wished to understand the point.

After the Committee had conferred,

The CHAIRMAN said: The Committee will accept the proposal, on the understanding that those are the extreme dates which will be allowed—that when the period for the 15-candle gas comes, you will be subject to the same tests as you are now for 16-candle gas?

*Witness:* Exactly.

And subject to the same penalties for equal deviation?—Exactly.

And if at any time earlier than July 1, 1905, you are able to go down to the 14 candles (it must be done in half years), from the half year when you so proclaim yourself ready to proceed, the public will have the advantage of the 1d. reduction, and you yourselves will be bound not to hark back?—Certainly; and if we cannot reduce to 14 candles in five years, the price must be reduced anyway.

Lord R. CECIL: Probably the best plan would be that we should give notice that we are prepared from and after a certain date. Of course, the final limit is July 1, 1905. If Mr. Livesey finds himself in a position to make the reduction earlier than that period, he will give a public notice of, say, three months before the beginning of the next half year; and then the reduction will take effect as from that date instead of July 1, 1905?

*Witness:* Yes.

The CHAIRMAN: But from July 1, 1905, the lower price takes effect, whether there is a lower candle power or not?

*Witness:* Yes.

In that case, you will have clauses to draft?

Lord R. CECIL: I am afraid I shall have to ask for a short adjournment to draft that clause.

*Witness:* Might I say one word? I was very pleased to hear your remark that the testing is to go on on the same lines as at present. Of course, there must be no alteration in the system of testing; otherwise that might materially affect the apparent quality of the gas. It must go on on the same lines as at present. I was informed by a leading official of the London County Council that next year they are going to introduce their portable photometer Bill again; and if those tricks are played——

The CHAIRMAN: Next year's Parliament must decide its own legislation.

*Witness:* But your impression is that the testing is to be the same as now?

The CHAIRMAN: Yes; that has been the basis all through.

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### Thursday, May 24.

The Committee to-day proceeded to the consideration of the clauses; but before doing so, it was pointed out that the preamble was not conformable with the alterations to be made in the Bill in connection with the illuminating power of the gas and the prices to be charged. The necessary verbal amendments were accordingly made in the preamble.

Mr. TALBOT said that clause 5, which dealt with the illuminating power, had words at the end bearing upon the giving of notice of reduction in such power to the consumer. It said "giving three months' previous notice of their intention to the consumers of their gas and to the London County Council." He thought the notice should be defined in some way. There should be a written notice given; and provision should be made for its publication.

Lord R. CECIL said the Company could not be expected to give notice in writing to each of the consumers. Difficulties would arise if this were required.

Mr. TALBOT: The notice to the public should be by advertisement in the newspapers.

Lord R. CECIL: There is no difficulty about that. I am obliged to my learned friend for calling attention to the matter. We will state in the clause that notice shall be given by advertisement in the newspapers or to the London County Council.

Mr. TALBOT: I think we should have both.

Lord R. CECIL: I do not object to that.

Mr. TALBOT: The Clerk to the Camberwell Vestry, on his own behalf and for the other Local Authorities, is anxious that under this clause provision should be made for giving notice to each of the Local Authorities in the district. There are twenty Vestries; but the Local Authorities under the London Government Act whose districts will be affected are about seven in number.

The clause was then amended so as to conclude as follows:—

Giving three months' previous notice in writing of their intention to the London County Council, and to the Town Clerks of the several Metropolitan Borough Councils in the district of supply of the Company, and by advertisement in one London daily paper and in one paper circulating in the said district.

Mr. LITTLER: As to the position of the Corporation of the City of London, I wish to say that we have very carefully considered it, as regards ourselves and all the consumers north of the Thames; and we feel in a serious difficulty, because we still—and I say it with all respect to the Committee—think that we are right, and that the Bill as it has been passed, without the provisions we desire to see inserted in it, will make a present to the Company of £40,000 a year. I am not going to re-argue the matter for a moment; but I do wish to make quite clear the position we take up. The matter is one we regard as so important that we cannot discuss it on clauses. We think it is of the essence of the Bill, and, therefore, a matter of preamble; and we trust you will not deem it disrespectful if we do not take any further part in discussing the measure—for that reason, if for no other.

The CHAIRMAN said that something in the nature of a description of the standard burner would be required in the Bill.

Mr. TALBOT drew attention to the new clause 7A. He said it provided that the Company should supply suitable burners in lieu of those in use. The Committee had decided to grant a reduction in the illuminating power of the gas, but had done so on the idea that this would be met by the adoption of a certain burner. There was, however, a twelvemonth's time limit for the supply of the burner. His clients saw no reason why the consumer should have a time limit put on him, beyond which he should not be able to apply for a burner. He would suggest that there could be no good reason on the part of the Company for not supplying a proper burner at any time. He thought an amendment in that sense necessary to secure the results contemplated by the Committee.

The CHAIRMAN said there ought to be a time limit; for a man must decide in his own mind whether or not he would trust himself to the Company. He might decide not to have the burner; and in five years' time he might wake up one morning, and say: "I will have my burners altered."

Mr. TALBOT: How can it hurt the Company, even if he does? They will have plenty of burners in stock.

The CHAIRMAN: The Company ought to know when a certain part of their business is finished.

Mr. TALBOT: They must always have new consumers; and to these they will supply burners as a matter of course.

Lord R. CECIL: We are only dealing with existing consumers.

Mr. TALBOT: Perhaps the Company can satisfy the Committee on this point. I shall be glad to hear their case.

The CHAIRMAN: I do not want them to satisfy me. I am satisfied.

Lord R. CECIL: If it will meet my learned friend's views, we will put in "two years," instead of "twelve months."

Mr. TALBOT: You are giving until 1905 for 14-candle gas. There may be a consumer satisfied with 15-candle gas up to that time; but after that he may want the new burner. There does not seem to me to be any very substantial objection to my proposal.

The CHAIRMAN: We have one year for 15-candle gas.

Mr. TALBOT: Yes; and within twelve months after July 1, 1901, according to the clause, the burners must be supplied. That covers the first year of the 15-candle period.

Lord R. CECIL: In the Dublin case, which is the precedent for this, there was only three months allowed.

The CHAIRMAN: The public practically have two years now—up to twelve months after July 1, 1901. The matter will be before the public for two years. If twenty-four months is put in in place of twelve months, that will mean three years' notice.

Lord R. CECIL: That is so. We agree to the insertion of the words "two years," in place of "twelve months."

The clause was amended accordingly.

Mr. TALBOT: As to the question between the 1d. and 3d.

The CHAIRMAN: You mean the 1d. per candle power?

Mr. TALBOT: The 2s. 8d. for the 1d., as against the bonus.

The CHAIRMAN: We felt that, seeing the standard is now, at the recommendation of the Committee, lowered a further 2d. on consideration of the illuminating power, it would be difficult to get an additional 3d. below the standard so reduced; and we thought any achievement in that direction should have a bonus attached to it.

Mr. TALBOT: I presume the Committee have considered the effect of this Bill on the capital of the Gaslight and Coke Company, in so far as it enables the South Metropolitan Company to purchase a part of that Company's district. We shall have to go into it between the proceedings in this House and in the House of Lords, in the hope of coming to some arrangement with the promoters. If we cannot come to an arrangement, we must reserve our right to oppose that part of the Bill in the other House.

The CHAIRMAN: We have thought that over; and it seems to us that we should be going beyond the preamble of the Bill in prescribing anything in regard to the manipulation of the capital of the Gaslight and Coke Company. We do not see that we have any *locus standi* to deal with it. If in another place something can be provided in the shape of a clause, well and good. We have nothing before us.

Mr. TALBOT: The best way to proceed would be to cut out the reference to the purchase.

The CHAIRMAN: We do not wish to inflict a disability on this Company. In all probability, the other Company will attempt to deal with the matter before long. It is "on the cards" that the clause will not be operative until the other Company have obtained power. Will an empowering clause in this Bill enable the other Company to sell?

Mr. TALBOT: We are very much afraid that it will.

Lord R. CECIL: The first part of clause 25 says—

The Company may purchase: (1) That portion of the undertaking, works, lands, hereditaments, mains, and property (real and personal) of the Gaslight and Coke Company which is situate in that part of the Administrative County of London which is on the south side of the River Thames (hereinafter referred to as "the transferred undertaking"), and all powers, rights, privileges, and authorities of that Company so far as they relate to the transferred undertaking, for such price or consideration, and generally upon such terms and conditions, as may be agreed on between the Company and the Gaslight and Coke Company; and the Gaslight and Coke Company may sell the same to the Company accordingly.

So that the sub-section empowers the one Company to sell and the other to purchase.

Mr. COATES: And clause 26 gives power to the two Companies to enter into an agreement.

Lord R. CECIL: We shall be glad to discuss the matter with the County Council between this House and the other; so as to remove, if possible, the only point of difference between us. I do not see that anything can be done now.

Mr. TALBOT: We reserve to ourselves the right to oppose the sliding-scale in the other House. I say no more about it.

Lord R. CECIL, in reply to the Chairman, said the promoters did not alter the testing arrangements at all. They simply varied the standard power and the initial price. The present Bill would become a Special Act; and the whole of the existing machinery under the Act of 1880 would apply to it.

Mr. TALBOT: We are quite agreed as to the intention; but we are not sure that it would not be better to put in words making it clear that this is a Special Act within the meaning of the Act of 1880.

Lord R. CECIL: There is no doubt about the intention.

The following, as an addition to clause 7 (which describes the burner to be used for testing the illuminating power), was then brought up and agreed to:—

Provided that when, under the provisions of this Act, the prescribed illuminating power shall be 14 candles, the said burner shall be used with the chimney prescribed by the Gas Referees for gas of the illuminating power of 14 candles.

Mr. TALBOT said he was not in a position to discuss the matter now. The County Council would consider it hereafter.

The Bill, as amended, was then ordered to be reported to the House.

## HOUSE OF COMMONS COMMITTEE.

### Monday, May 21.

(*Before Mr.* MARK OLDROYD, *Chairman, Mr.* NICOL, *Mr.* TENNANT, *and Mr.* STANLEY LEIGHTON.)

### WANDSWORTH AND PUTNEY GAS BILL.

This Bill, under which power is taken to convert the capital of the Wandsworth and Putney Gaslight and Coke Company, and to raise additional capital to construct works, came to-day before a Select Committee of the House of Commons constituted as above.

Mr. BALFOUR BROWNE, Q.C., Lord ROBERT CECIL, Q.C., and Mr. MOON were for the promoters. The other Counsel engaged were: Mr. WORSLEY TAYLOR, Q.C., Mr. TALBOT, and Mr. BERNARD WILKINSON, for the London County Council; and Mr. PEMBROKE STEPHENS, Q.C., and Mr. VESEY KNOX, for the Wandsworth District Board of Works. An appearance was reserved on behalf of the Vestry of St. Mary, Battersea.

Mr. BALFOUR BROWNE, in opening, said the Company at present had 71 miles of mains, 14,000 consumers, and a large number of prepayment meters. One object of the Bill was to convert the capital, as a number of companies had done. It was proposed to convert £15,000 of 1856 10 per cent. stock into £30,000 "A" consolidated 5 per cent. stock; £15,000 of 1856 7½ per cent. stock into £31,200 "B" stock; £40,000 of 1866 ordinary capital into £80,000 "B" consolidated stock; £15,750 converted 1856 and 1866 capital into £31,500 "B" consolidated stock; and £56,468 of 1880 ordinary capital into £112,936 "B" consolidated stock. The "B" stock was to bear interest at the rate of 3½ per cent. per annum. Then it was proposed to consolidate the debenture capital—amounting altogether to £32,000—into an equivalent amount of 3 per cent. consolidated debenture stock. The standard price of the Company was fixed, in 1880, at 4s. per 1000 cubic feet; and they were now supplying the cheapest gas of any company south of London, with the exception of the South Metropolitan Company—their price for 14-candle power gas being 2s. 2d., which was 1s. below the average of the fourteen Suburban Companies of London. The Company were able to do this, because their capital, having regard to the production of gas, was very small—being only £339 per million cubic feet sold. The Company were, however, indebted to their banker to a considerable amount. They were asking for power to raise £300,000 of new capital, which was absolutely required for the immediate needs of the Company. The only objection there could be to granting this power, was that it might enable the Company to remain too long away from Parliament. The idea in the report of the Committee of last year was that Gas Companies ought to come to Parliament every five years; but he deprecated too frequent applications by a small company, because it meant the accumulation on capital account of sums of money which were unremunerative. The matter, however, was one for the Committee to judge of. The Company calculated that in future they would not be able to keep the capital down to £339 per million cubic feet, but that the figure would be nearer £500. Even this figure, however, would be very much below the average. The Company were at present exceedingly cramped; and they were therefore buying land for extension purposes. This land was on the river and railway, which gave facilities for taking coal in and carrying coke out, and in a district in which there could be no objection to the presence of gas-works, because they would be surrounded by manufactories. Difficulty arose from the fact that the site was intersected by a certain number of roads and footpaths. These were mainly useful for people going to the works; but as most of the works concerned would be swept away, there would be no necessity for them. There would be no disadvantage at all to the public in shutting up these lanes, and the

Company would want all the scheduled land within ten years. The opponents to the Bill were the London County Council and the Wandsworth District Board of Works, also the Battersea Local Authority, who, however, had reserved Counsel. As to the Wandsworth Board of Works, he could not imagine why they were there. They had appointed a Committee to confer with the Directors of the Company; and the conference was held, and an agreement arrived at. But the Board subsequently repudiated the settlement. The Company supplied a large amount of gas for other than illuminating purposes—that was to say, for heating and for driving gas engines. They were of opinion that the Committee would not say that 14-candle gas was not sufficient in Wandsworth and Putney, when they had decided that this was a good gas for the south of London.

The CHAIRMAN: It is 14-candle gas with conditions.

Mr. BALFOUR BROWNE: The promoters were neighbours of the South Metropolitan Company. With regard to the petitions against the Bill, the County Council, in paragraphs 5 and 6, spoke about the proposed conversion of stock; and in paragraph 7 they said: "Your petitioners would point out that the effect of this consolidation and conversion of capital would be to cause an addition to the saleable value of the Company's capital, while it would confer no benefit upon the public or the consumers of gas." Well, this subject had been threshed out again and again at the instance of the County Council and others, who had always failed. Many companies, both in London and the Provinces, had been allowed to convert their capital. The petition continued: "And, further, that the proposal would have the effect of concealing from the public the fact that the Company are paying 15½, 13, and 12½ per cent. upon the various classes of the Company's nominal paid-up capital (£139,250), which, together with a sum of £58,972 received for premiums and applied for capital purposes, represents the money received into the capital account of the Company and expended, or to be expended, on the undertaking, and would cause it to appear that the Company are only obtaining dividends at the rate of 7⅜ and 6¼ per cent. upon their ordinary capital." In paragraph 8, they said: "Your petitioners humbly submit that if this consolidation and conversion is allowed by your honourable House, the Company should be required to publish their statements of capital account in such a form that the effect of the conversion both on nominal capital and dividend may be clearly shown."

Mr. WORSLEY TAYLOR remarked that he had no doubt they would be able to arrange this.

Mr. BALFOUR BROWNE said he would leave the point on that understanding. Then as to the ordinary stock clause, the petitioners said: "The Company also seek power to raise additional capital, not exceeding £300,000, by the creation and issue of ordinary stock, and to borrow in respect thereof not exceeding £100,000."

The CHAIRMAN: What is the capital?

Mr. BALFOUR BROWNE: £230,000, including the debenture stock.

Mr. TENNANT: And what is the rate of interest on the old stock?

Mr. BALFOUR BROWNE: Five per cent. Paragraphs 10 and 11 dealt with the acquisition of lands, which he had already explained. Paragraph 12 had reference to the laying of mains, and other ordinary matters; and he would pass it over. Paragraph 13 was unnecessary—pointing out how London was at present supplied with gas. The Committee were aware of all those matters. In paragraph 14, the petitioners said: "Your petitioners humbly submit that the district within the area of supply of the Wandsworth Company has now become so developed with building, that if further powers be conferred on the Company it is expedient that they should be placed under similar provisions to those which are in force in regard to the rest of the Metropolitan Gas Supply." He should resist this to the utmost. The Company were not under any of the Metropolitan Acts; and they had never been treated as a Metropolitan Company. There were thirteen or fourteen Suburban Companies, all round London, similarly situated to the promoters of this Bill. If there were any general legislation to bring all these Companies in, the Wandsworth and Putney Company no doubt would be included; but he objected to the Company, when they came forward alone seeking an extension of their powers, being treated as a London Company. The petition went on: "Your petitioners object to the new powers of raising capital proposed by the Bill, and submit that they are excessive; and they further submit that, if further powers are conceded to the Company, the standard price of the Company, which is now at 4s. per 1000 cubic feet, should be reduced." This he also resisted as strenuously as he possibly could. Rather than have this done, he would withdraw the Bill, and refuse to raise the capital which was necessary for the supply of the district. The Company had raised a large amount of capital under the Act of 1880; and people had subscribed to it, and had paid large premiums for the stock, on the understanding that the dividend should be on a standard price of 4s. per 1000 cubic feet. It would be dishonest to the persons who had so subscribed, to say that they should take a standard price lower than 4s. If the standard were altered, the Company would have been allowed to go to the public altogether under a false impression. He had never known Parliament to go back on a power given in the manner now proposed. The only precedent which could be quoted for what was now asked was the Lea Bridge case; but the alteration was allowed in that instance on the express ground that no capital had been raised under the provision of the sliding-scale. It was a scale in the air, and had not been used. He asked the Committee not to touch the sliding-scale. The 15th paragraph said: "It is proposed, by clause 29 of the Bill, that the insurance fund of the Company may accumulate until it amounts to a sum equal to one-twentieth of the paid-up capital of the Company. Your petitioners would point out that, inasmuch as the proposed conversion of capital would increase the nominal amount of the capital of the Company, the limit of the insurance fund would be correspondingly increased; and your petitioners submit that the limit of the insurance fund ought not to be increased as the result of such conversion, which does not in any way increase the probable demands upon the said fund." He should be willing to assent to the insurance fund not being increased. The 16th paragraph dealt with the same thing. The 17th said: "Power is sought by the Bill to take houses in the County of London, occupied to a considerable extent by persons of the labouring class, as defined in the Standing Orders of your honourable House relating thereto. Your petitioners are continuously engaged as the Authority under 'The Housing of the Working Classes Act, 1890,' in removing or improving insanitary and crowded areas in the County of London; and they are continuously making large expenditure out of moneys raised by the creation and issue of stock in carrying out schemes for the improvement of unhealthy areas, and otherwise under the said Act for the rehousing of persons displaced." This was all true; but these schemes for rehousing the working classes had to receive the assent of the Home Office, and he did not think the general law in the matter was likely to be altered in favour of the London County Council. The petitioners next said: "Your petitioners humbly suggest that it would be convenient if the arrangements to be made under the Bill for providing new dwellings for persons of the labouring class were made in concert with your petitioners. Your petitioners submit that a satisfactory scheme should be settled and provided for in the Bill." He did not suppose the Committee wished to undertake the function of the Home Office. Therefore, he would ask them not to provide for any scheme. Paragraph 18 said: "By clause 38 of the Bill, it is proposed to exempt certain buildings of the Company from the London Building Acts, which are administered by your petitioners. Your petitioners deny that any public necessity can be shown to exist for the proposed exemption; and they object thereto." Well, the Company were under the Building Acts. The 19th paragraph set forth: "Your petitioners submit that further powers should be inserted in the Bill prohibiting the Company from using for buildings any of the lands which are shown on the deposited plans, but are beyond the general line of building in the street, and for providing that the effect of the London Building Acts shall not be evaded by the Company. The powers sought by the Bill will injuriously affect the tramway depôt of the South London Tramways, which your petitioners have the right to purchase; and your petitioners object thereto." He did not know how this was; but it was a small matter, and he should leave it to be settled by his learned friend in examining witnesses. He would not go into the remaining points. The material opposition was in regard to the standard price; and it was also desired that the Company should be put under the restrictions that the three London Gas Companies were under. The Company would not now be, and never had been, a Metropolitan Company. Turning to the petition of the Wandsworth Board of Works, paragraph 2 commenced: "Your petitioners are the Highway, Lighting, Sewer, and Sanitary Authority of the Wandsworth district, in the County of London, constituted under the Metropolis Management Act, 1855, and the Acts amending the same, comprising the parishes of Wandsworth, Clapham, Putney, Streatham, and Tooting Graveney, having an area of over 14½ square miles, a population of over 200,000, and a rateable value of £1,354,172." If the petitioners were the Lighting Authority, he presumed the London County Council were not. Which was the right Authority to look after the matter? The paragraph continued: "Your petitioners, and the ratepayers and inhabitants of their district, are consumers of gas supplied by the Company. The rights, property, and interests of your petitioners and of the community represented by them will be prejudicially affected by the powers sought by the Bill, in the manner, and for the reasons, hereinafter appearing; and they object thereto. The preamble of the Bill, after reciting the expediency of converting and consolidating the existing capital of the Company in the manner thereinafter set forth, further recites that the demand for gas within the Company's limits of supply is increasing, and it is expedient that the Company be authorized to raise additional capital to acquire additional lands and to construct additional works, as hereinafter provided, in order to enable them to meet such increased demand." This was just the usual thing. Clause 4 set out the Bill; and as to clause 5, in regard to accommodation for the working classes, the petitioners, he understood, were now satisfied with the Bill. Paragraph 6 said: "By clause 4 of the Bill, certain restrictions are proposed to be imposed upon the Company on displacing persons of the labouring class in the County of London. The provisions of this clause are unsatisfactory; and your petitioners say that their approval of the scheme for providing new dwellings should be obtained before the same be carried out." Was not this ridiculous? The Home Office would have to approve of any scheme decided upon; and yet neither the County Council nor the Board of Works were satisfied. Each of them wanted to have a voice in approving of a scheme. Paragraph 7 said: "By clause 6 of the Bill, it is proposed that, in addition to any other lands which the Company seek powers by the Bill to take or purchase, the Company may, for the purposes of their undertaking, purchase, take, and hold (by agreement, but not otherwise) any lands and hereditaments, not exceeding in the whole 20 acres, which the Company may from time to time require for the purposes of their works and undertaking. It is evident from these provisions that the Company contemplate the acquisition of other land which may be situate in the immediate neighbourhood of their works; and your petitioners respectfully submit that such a proposal should not be sanctioned. The Company have no immediate or prospective necessity for such a large quantity of land; and the acquisition thereof would cause an unnecessary and unremunerative addition to their capital, tending to prevent a reduction of their charges." A great portion of this land was already in the hands of the Company; and the clause in the Bill objected to was the ordinary one which found a place in all measures of this description. If besides the land immediately required, power was taken to purchase 20 acres, it was only that the Company might be able to treat for the acquisition. The clause would not give them power to build new gas-works on the site. This would require fresh parliamentary sanction. The powers they sought were simply to enable them to go into the market and buy the land, to prevent buildings being put upon it, which would make it very dear. It was land which would in all likelihood be required for the undertaking in the future. In the 8th paragraph, the petitioners set out the streets and roads which the Bill proposed to authorize the Company to stop up and discontinue for the public use. The paragraph went on to say: "Your petitioners, among others, now use the roads in question, and will in the near future use them more frequently. Your petitioners therefore submit that the powers sought by the Bill should not be granted to the Company at all, or in any event unless, and until, they provide, sewer and pave, and light at their own expense, a road 40 feet wide." He could never consent to the construction of a new road 40 feet wide right through the Company's works. In paragraph 9, the petitioners said: "The acquisition and demolition by the Company of so much rateable property, has affected and diminished the rates within your petitioners' district; and the effect of the proposed acquisition and demolition of rateable property will still further diminish such rates.

Your petitioners therefore submit that the proposed further destruction of rateable property should not be authorized, or only upon condition that the Company make good such diminished rates, both in respect of property already acquired and that proposed to be acquired." The poor-rate authorities were quite alive to the increase in the rateable value, because at the last quinquennial valuation there was a great fight as to what was the value of the works; and the rate now fixed was far more than that which would have been paid by the property displaced. The proposal at the end of the paragraph was altogether a new departure. Clause 10 of the petition had reference to the part of the Bill dealing with conversion of capital; and he would not refer to it again, as he had mentioned it already. Paragraph 11 began: "Clause 16 of the Bill provides that the existing standard price of the Company's gas is to continue unaffected. This price is 4s. per 1000 cubic feet; whereas the standard price of the South Metropolitan Gas Company, which supplies a part of your petitioners' district adjoining the district of the Company, is 3s. 6d. per 1000 cubic feet." The Company were aware of this; but the price would not be 3s. 6d. in future. After a reference to the report of the Committee of last year, which did not apply to this Company, the clause concluded as follows: "Your petitioners submit that the Bill should be amended to give effect to all the recommendations of the Committee referred to, so far as the same shall be applicable, and in particular that the Company's standard price for gas should be reduced." He would ask the Committee not to do what would really constitute a confiscation of the property of the Company. Paragraph 12 ran: "Your petitioners further submit that the provisions of the Bill for offering the proposed new stock for sale by public auction are insufficient for the due protection of the public and the consumers and ratepayers of your petitioners' district, and that the notices of such sale by auction proposed to be given by clause 23 of the Bill are insufficient." He did not know what these were—they were the ordinary notices, he supposed, which had been given effect to in other cases. The petition was a long one; and he would not go right through it, if his learned friend would indicate the paragraphs he thought material.

Lord R. Cecil: Paragraphs 13 and 16.

Mr. Balfour Browne said that paragraph 13 was as follows: "Your petitioners object to the powers proposed by clause 33, enabling the Company to lay pipes in streets not dedicated to the use of the public; and say that such powers should only be granted (if at all) subject to the sanction and approval of your petitioners as to the position of such pipes." They said that if the pipes were not dedicated to the public, they belonged to private people. Why these powers should be subject to the consent of the petitioners, when the pipes did not belong to them, he did not know. Paragraph 16 commenced: "The Company are not subject to the provisions of the Metropolis Gas Act, 1860, and the Gaslight and Coke and other Gas Companies Amendment Act, 1880; and their prescribed illuminating power is only 14 candles." This was the same point as that raised by the County Council. The petitioners said: "Your petitioners submit that the powers sought by the Bill should be granted (if at all) only upon condition that the above-mentioned Acts, or any other General Acts relating to the supply, illuminating power, purity, and pressure of gas in the County of London, and the testing-places and testing apparatus thereof, be incorporated in the Bill. For the reasons set out, and many others, your petitioners object to the Bill, and deny the existence of any public necessity for the construction of the proposed works at all commensurate with the injury to property and public and private interests which will be inflicted upon your petitioners and others if the Bill pass into an Act. Your petitioners submit that the Bill, as presented, is needlessly oppressive and confiscatory in its character, and should not pass into law." He should have thought that the confiscation would have been on the side of the petitioners, when they came to alter his standard. No owners of property objected to the Bill—only these two Local Authorities. The Bill was simply to get further land and capital; and they could not go on discharging their duty to the public unless they got that. What they were asking for might be too much or too little. If it was right, the Committee, he thought, would pass the Bill; but in all seriousness he asked them to say whether, in a Bill of this nature, they were going to alter the whole of the previous legislation, and pitchfork this district into the legislation which up to the present had been confined entirely to the Metropolis. He thought they would not do that. And he also thought they would not touch the standard price. The Battersea Local Authority had petitioned against the Bill; but in their case Counsel was reserved. Their point was that the standard price was too high, and ought to be reduced. In this they joined with the other petitioners, and urged that Parliament should break faith with the Company. He asked the Committee not to yield to these petitions.

Mr. *H. E. Jones*, examined by Mr. Moon, said he was Deputy-Chairman of the Company. He was Engineer from 1862 to 1869, and had been a Director most of the time since. The undertaking was very small till six or seven years ago, when it began to develop with great rapidity, especially since the introduction of the system of supplying gas by prepayment meters to the working classes, to which class about a half of the customers belonged. The Company had nearly as many slot-meters as ordinary consumers, which was very unusual. The charge for slot-meter fittings was 11d.; the many clerks, &c., who used them liking a better kind of chandelier and stove than the working classes were generally content with. Tenpence would be quite enough for the fittings required by the working men. The 11d. included interest, depreciation, repairs, and so forth. Owing to the great care with which the capital had been expended, and to the bulk of it having been raised and sold by auction under the moderate dividend of 7 per cent., the Company required the smallest amount of profit of any in the neighbourhood, out of the gas, to pay their dividends; and they therefore supplied gas far more cheaply than any company comparable to them in the South of England. The present price was 2s. 2d. per 1000 cubic feet; the obligation under statutes on the Company being to supply 14-candle power gas. As a fact, the gas was of over 15-candle power. They used a slight amount of enrichment, but chiefly as a makeshift in time of pressure. The district was large and straggling—there being 71 miles of mains; so that, although the number of consumers per mile was 173, the amount of gas taken per consumer was only 48,000 cubic feet, against 51,000 feet which was the average of the twelve Suburban Companies. The population of the Company's area was now about 92,000. The Company had fully exhausted all the land they had power over by the former Act, and had been fortunate in securing immediately adjoining the existing works some 9½ acres of additional land, which, together with some not yet bought, the Company now sought the authority of Parliament to use for gas purposes. This land abutted on the Thames, and was bounded practically on the south by the London and South-Western Railway, which cut it off from the better class portion of the district; and, further, the land lay between the existing works on the west, and a tramway stables on the east. If the business was to be developed, no better site could possibly be found. But it happened to be intersected by some narrow footpaths and a winding lane, not 9 feet wide at places, which the Company proposed to stop up. There was, however, practically no traffic, except that in connection with the Company's works. As to the suggestion that the illuminating power of the gas should be increased, witness entirely agreed with Mr. Livesey on the subject; and he pointed out that the Company were kept in order by the active competition of the London and County Brush Electric Light Company. Under the sliding-scale, for every £3063 gained or lost by the reduction or addition of 1d. to the price, the shareholders' proportion was £355, while that of the consumers was £2708. The Company believed that their progressive course in reducing the price of gas would be interrupted if there were any increase in the illuminating power. Coming to the capital requirements, witness said the present sale of gas was 651 million cubic feet a year; the daily average output of a maximum week being 3,350,000 feet. The rate of increase was just under 8 per cent. per annum compound, which meant that the business would be doubled in about nine years. The total capital expenditure at Christmas last was £238,098; and there had been spent since £13,372—making a total of £251,470. Besides this, there was owing to the bank £30,000. The further expenditure necessary was £3500 for land, £4500 for the gasholder, £3500 for the tank, £1250 for purifiers, and £2000 for oil-gas plant, which made the capital expenditure £296,220, against a capital authorized of £236,000; so that the Company were very much at the mercy of the Committee. Of this £296,220, £43,500 for stoves and £39,000 for coin-meter fittings, was outside the ordinary requirements of capital for the supply of gas. Deducting this amount, left the capital for works and mains at £213,720. This amount, on the annual sale of 651 million cubic feet, worked out at £328 per million, which was very low. Of this sum, the Company had incurred to their bankers and others liabilities in excess of their present powers for £60,000. After the completion of the work in hand, it would be necessary to commence an installation of works on the scale of 2 million cubic feet per diem, or (say) 400 million feet per annum, to provide for the increase of the next five years, which, at £330 per million feet, would cost £132,000, to which there was to be added £2000 the cost of obtaining the present Act, and £17,500 for rehousing—providing under the requirements of the Local Government Board the equivalent of 70 houses—making £211,500. A further addition to capital in respect of coin and ordinary meters was allowed of £58,750. This sum, with the £211,500, made a total of £270,250. When this was expended at the end of the five years, the Company would require to start afresh on an additional section of works, which, on a scale of 2 millions per diem, would require £132,000, and, *plus* £39,000 for coin-meters, ordinary meters, and fittings, make the total required in nine years £441,250. As against this, the Bill asked for £300,000 of share and £100,000 of loan capital. If the present rates of metal, building materials, and wages continued, at least 25 per cent. more than these sums would be necessary. As to the conversion of capital, the proposal was simply to halve the standard dividend and double the stock, which would not increase the dividend a farthing, though it might benefit the holder of stock, because the public had a liking for low rather than high dividends. It was provided that the Company should not raise more than £60,000 of capital in any one year. As to the petition of the London County Council, the small scale of the undertaking and the past history of Metropolitan gas legislation necessarily excluded it from being brought into the same range as the three London Companies, the capital of which averaged over seven millions apiece. As to the objections of the Wandsworth authority, the estimate included provision for dealing with the houses involved in a way which satisfied the Local Government Board. All the houses pulled down so far had been insanitary, and practical rookeries; so that it was hardly fair the Company should undertake even as much as they did under the Bill. Power as to 20 acres of land was taken, as it would be necessary for the Company to look out for land for extensions, and to acquire it without waiting until they had to schedule it to an Act, and so greatly enhance its value. Regarding the content with reference to the standard price in the petition, witness pointed out that the cost of producing gas was enormously increased—about 10d. per 1000 cubic feet—by the advance in the price of coal; and it was therefore not a suitable period to consider an abatement of the standard. Indeed, such an abatement could not be made, in view of the fact that for the last twenty years capital had been sold by auction upon the faith of the dividends, and that the dividends had been paid fully up to the standard price. As to the new capital, the Company were open to take any provision for interest on it which the Committee might think proper; but if the dividend were cut down, it would realize less premium at auction, and therefore not be so favourable to the consumer.

Cross-examined by Mr. Worsley Taylor: The Company had not been before Parliament for the last twenty years; and in this time there had been considerable changes in the district and in the attitude of people towards gas. The Company were now asking to more than double their capital. He agreed that, in the circumstances, the legislation applicable to the Company should be reviewed and brought fairly up to date. The east of the district had little to distinguish it from the area of the South Metropolitan Company, which it adjoined, but where the conditions were very different. The testing of the gas was done by an officer of the Local Authority, who visited the works for the purpose without giving notice. There had been no complaints of bad gas from the Local Authority. Formerly the Company were under obligation to supply 12-candle gas; and subsequently the figure was raised to 14. The testing was governed by the Local Acts of 1856 and 1866, and by the General Act (the Gas-Works Clauses Act) of 1871. The Local Authority could test at one place only—that place being at the works—and only between certain hours. He did not think there was any objection to the authorities having a testing-place where they liked, so long as it was satisfactory, and on a good main. He would object strongly to come under the same

obligations as the London Companies. Besides the testing for sulphuretted hydrogen, there were tests for ammonia with the London Companies, but not out of London. The Company were prepared to take the Crystal Palace Company's clause with regard to sulphuretted hydrogen. On the question of the standard price, he agreed that the 10 per cent. capital received 15 per cent. dividend, and the next stock 13½ per cent. Whenever the sliding-scale worked properly, the price of gas went down and the dividend rose. The Company, in expending their capital, had increased the works as well as the mains. In 1880, the sale was 148 million cubic feet. The slot-meter supplies had increased; the number laid on being: 1895, 1380; 1896, 2800 odd; 1897, 3860; 1898, 5181; 1899, 6000 odd; and now the total was above 7000. In 1895, the sale of gas was 412 million cubic feet; and in 1899 it had increased to 621 million feet.

By Mr. VESEY KNOX: The photometer used at the works for testing was, he believed, new within the past ten years. He had had no complaints regarding the nature of it. The district was increasing very rapidly, but not with very high-class consumers. He should say it could not be the fact that the Company were annexing 1½ acres of public street without compensation. If it were the case, the Company would be glad to pay liberally. He had no objection to giving notice of intention to sell stock by auction to the Borough Council of Wandsworth.

It was proposed that in future there should be a variation of 1s. 9d. for every penny in the price. This was to apply to the new shares only—not to the old. The reason was that, by an oversight, when the sliding-scale was used at first they allowed the 1d. for ¼ per cent. to rule both the 10 and 7 per cent. stocks, the result being that the 7 per cent. got a good deal larger increment if the price went down than the 10 per cent. One received 1s. 10d., and the other 1s. 7d. for the same reduction in price.

Mr. WORSLEY TAYLOR said that witness had agreed that there should be certain alterations with regard to the testing; and, in order to save time, he suggested an adjournment so as to allow an agreement, if possible, to be arrived at.

The CHAIRMAN: In that case we had better adjourn.

Mr. WORSLEY TAYLOR: Do you put your back against the wall with regard to the standard price?

*Witness:* Not in the least.

Are you willing to consider the question of the alteration of the standard price, or do you wish that to be discussed and disposed of by the Committee?—I would rather have the decision of the Committee on a point of this sort, if it would not be troubling them too much to deal with it.

The Committee then adjourned; it being understood that witness would meet and confer with the petitioners, with a view to coming to a settlement.

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**Tuesday, May 22.**

Lord R. CECIL said he thought Mr. Jones was anxious to explain what passed at the meeting of the Company, the Wandsworth Local Authority, and the London County Council the previous day.

Mr. *Jones* said the Local Authority were inflexible on the one point on which the Company had their backs to the wall—namely, that they should be regarded as a Metropolitan Company. They insisted that the Company should come under the Metropolitan Gas Referees, and adopt the 16 candles, and other provisions with regard to testing and purity, in force in the Metropolis. Then they asked that the pressure should be tested where they chose, and without notice; and he consented to this. The next proposition was that the Company should accept a reduction of 6d. in the standard price, and that there should be nothing given to the Company which would be a compensating factor. The alternative was that the Company should take the same legislation as the South Metropolitan Gas Company in the Bill the Committee had already passed. Besides this, the Company were not only to make the northern road 40 feet wide, but to enlarge the narrow footpath to a 40-foot road. Then the County Council wished to reduce the capital by half; whereas the needs were so extreme that the Company were in debt £60,000 already. They insisted on the Metropolitan legislation; and he therefore thought it unnecessary to go on. Under these circumstances, they came before the Committee again.

Lord R. CECIL: In other words, the proposals made by the other side were so extreme that practically there was no possibility of arriving at a conclusion at all?

*Witness:* They were inflexible.

Mr. VESEY KNOX said that, having regard to the decision of the Committee on the last Bill, he should not insist on the gas being of 16-candle power if there were concessions on other points.

The CHAIRMAN: Why do you say that this morning, after refraining from saying it yesterday?

Mr. VESEY KNOX: I understood that was our position yesterday.

Mr. WORSLEY TAYLOR said he thought it was unfortunate, and a little unusual, that one should have a full account given to a Committee of everything which took place while parties were trying to negotiate a settlement. One did not wish to keep anything back; but such procedure did not conduce to a settlement.

In reply to Mr. WORSLEY TAYLOR, witness stated that the points at issue between himself and the County Council were as to the capital, some improvement in the method of testing for both illuminating power and purity, and the standard price. He was still prepared to discuss these questions with the County Council.

Mr. WORSLEY TAYLOR said he believed witness had mixed up the position of the County Council and the District Board in the negotiations.

The CHAIRMAN: We have had enough of this. The negotiations have failed; let them drop.

Mr. P. CAUDWELL, Parliamentary Agent for Battersea, informed the Committee that his clients' objection was now to the standard price only.

In further reply to Mr. WORSLEY TAYLOR, witness said he was not prepared to give way at all in the matter of capital, because it was very expensive to come to Parliament. Once in nine years was quite often enough for a Company like this. There was no possible way in which the Company, as now existing, could take any advantage from the issue of the capital as proposed. To remove any doubt from the mind of the Local Authority, he thought there was no objection to there being another testing-place at the Town Hall, or at some other convenient spot upon a large main. He objected to giving more than one additional testing-place; there was hardly a company in the kingdom of the same size which had more than one testing-station. The Gas Examiner was appointed by the Wandsworth Local Authority; he should object to his being appointed by the London County Council. It was the vice of the London system that the Gas Examiners were appointed by that body, who had certainly shown a sort of hostility to the Companies. The appointment of these impartial men should be given to the Board of Trade, rather than to the Local Authority. With regard to the conversion of the capital, it had not been proved to him that this always resulted in an increase in the value of the stock, though generally, he believed, the average investor would rather buy a 5 per cent. than a 10 per cent. stock, because there was more certainty in the lower dividend.

Cross-examined by Mr. PEMBROKE STEPHENS (who said Mr. Worsley Taylor's cross-examination had covered all the points, except one, which he wished to raise), witness said, in reply to the suggestion that power was taken practically to absorb 1½ acres of public ways without equivalent, that the Company were prepared to widen Warple Road on the north side. They had bought property there; and as far as it extended, they would widen the road.

Re-examined by Lord R. CECIL: The Company would not injure the public by stopping these ways; and therefore he saw no reason why they should give compensation. The Company objected to the County Council being the testing authority.

Some further remarks were made at this point, regarding the meeting on the previous day, in the course of which

Mr. TALBOT said Mr. Jones had presented an inaccurate version of what passed. Mr. Jones absolutely refused to meet the County Council, unless the County Council could answer for the agreement of the District Board, which, of course, they could not do. It was entirely a misrepresentation to say the County Council were standing out.

The CHAIRMAN said he had consulted the Committee as to whether they should put the Company under the jurisdiction of the Gas Referees by placing them practically within the Metropolitan area; and they had decided not to do so. As to whether they should put upon them any similar procedure as obtained within the Metropolitan area, was another matter.

*Witness* said the Company were willing to supply the most modern photometer and appliances, and the best burner.

By Lord R. CECIL: The Company were prepared to do anything which any Suburban Company did now; but they were not prepared to be put under the conditions which prevailed with regard to the three great Metropolitan Companies. As to the standard price, he objected to any alteration of the condition on which the shareholders subscribed their money. There had been negotiations with reference to an alteration of the standard; but they failed.

Sir *F. Bramwell*, examined by Lord R. CECIL, said he had known the Company for some years past, and had studied it for the purposes of this inquiry. He believed it was a model Company, having a low price of gas and low capital per million cubic feet. The situation of the works was extremely good as regarded getting materials in and out, and being secluded from other property to which they might be a nuisance. He agreed that it was necessary to extend the works. Having lived in the neighbourhood of the works, he knew the footpath proposed to be stopped up, but was unable to conceive that there was any considerable traffic there, as it led practically only to or from the works. The selling price of gas being but a little more than 50 per cent. of the standard, was evidence of good management. It would certainly be unjust to diminish the standard price, on the strength of which capital had been subscribed.

In cross-examination, witness said he had not heard that the County Council proposed to build steps by Wandsworth Bridge, and so make a way for foot passengers through the area the Company were acquiring. He could not conceive that anyone going over the bridge would use the steps. There was a shorter route to Wandsworth than would be thus afforded. To force the Company to make one good way in place of the two narrow thoroughfares, would be to make them give excessive compensation.

By the COMMITTEE: The present conditions for gas-testing afforded sufficient security to the consumers; but there would be no objection to another station on an arterial main. He did not believe the capital asked for would be sufficient, unless there was a return to normal prices. Raising capital at as large a premium as was proposed, would not tend to extravagance, because if the Company were extravagant, away would go the dividend.

Mr. *Corbet Woodall* gave evidence in support of the proposals in the Bill. The extra capital power sought (£400,000) was reasonable. He assumed that in ten years the sale of gas would have increased by 865 million cubic feet, which, at a capital expenditure of £500 per million, meant £432,500. The figure of 865 millions was based on an increase of 10 per cent. per annum. He agreed that the land taken was admirably suited for gas-works purposes, and that the undertaking was well managed.

Cross-examined as to why the prescriptions of the London Gas Referees should not apply to the Company, he said the broad distinction between the three great Metropolitan Companies and this Company was that the London Companies necessarily manufactured gas at a number of works, and it was impossible therefore with one or two stations to make sure that the gas was properly tested; but with the Wandsworth Company, there was only one works, and a works testing-station would ensure that all the gas was of uniform quality. He saw nothing in what was known as the "Notification" of the Gas Referees with reference to the taking of tests, applicable to the London Companies, which was not also applicable to this Company.

By Mr. NICOL: The cost of a testing-station was about £200 a year. He deprecated very much indeed the multiplication of testing-stations in this district.

Mr. *E. H. Stevenson*, examined by Lord R. CECIL, thought the capital asked was too low, and that it would not last the usual period—viz., twelve or fifteen years. He agreed as to the excellence of the management of the Company, and thought a second testing-station would be extravagant and

useless. Witness was being examined about the footpath and lane which the Company propose to stop up, when

The CHAIRMAN said the Committee quite realized the position of the two footpaths; and all they wanted in regard to them now was evidence as to the traffic there.

Further examined, witness said not the slightest injury would result to the consumer from the standard price being 4s. and the selling price 2s., per 1000 cubic feet. Grave injury would accrue to the public if the standard price were altered, because the capital as sold now fetched a high premium; whereas if the investor knew that the standard was liable to revision from time to time, he would rarely give more than par for the stock, because he would be uncertain of the return. The consumers were far more interested in the financial management of the Company than the shareholders. In this case the proportion was about 10 to 1.

Mr. TALBOT said, with regard to testing, the County Council would be met if the Company would agree to the establishment of such additional testing-places as the Committee might think fit, and would accept such conditions with regard to testing for illuminating power, purity, and pressure as the Gas Referees might prescribe from time to time, and, further, accept the Notification which Mr. Woodall had said was applicable to the Company.

The matter was discussed, but in the end not accepted.

*J. Clarke*, an ex-inspector of police, gave evidence of the foot and vehicular traffic at Waterside from Aug. 21 to Sept. 9 last, between the hours of 8 a.m. and 7 p.m. The foot passengers ranged between 20 and 60, and the vehicles between 4 and 10 per day. Of the foot passengers, a number went to get drink at a public-house since acquired by the Gas Company; while others went to a house in course of erection. The average was about 39 foot passengers and 7 vehicles daily.

*Chas. Bradley*, another ex-inspector of police, gave similar evidence with regard to the same thoroughfare between Nov. 27 and Dec. 9, when, on an average, there were 12 passengers and 13 vehicles per day connected with the Company, and 5 passengers and 1 vehicle not connected with the Company. Practically, the place was not used at all. Church Walk, one of the thoroughfares affected, was even less frequented.

Mr. *H. H. Jones*, Engineer and Manager of the Company, agreed with the evidence given regarding the growth of the district. At present the works were strained to the utmost to give the necessary day and night supplies; and to cope with the pressure at night, he had to reduce the pressure in the day. On occasions last winter, they could have sold quite half-a-million cubic feet more than it was possible to in future. When the holder now being erected was completed, the works would be just equal to the maximum day's consumption. The works, land, and capital provided for in the Bill were absolutely necessary.

Dr. *Howell*, Chairman of the Company, in supporting the Bill, said the Company had always done their best to serve the public and the consumers, and had succeeded in every sense.

Lord R. CECIL: That is our case.

Mr. TALBOT: Might I request you would intimate the points on which you understand the Company to be prepared to agree to modifications of the existing law? There are the additional testing-place, the modernization of the photometer, the Crystal Palace clause with regard to purity, and the modification of the clause with regard to pressure.

The CHAIRMAN: I do not know anything about the last point. We have not had the pressure dealt with. I do not want to introduce it if it is understood between you.

Mr. TALBOT: It is subject to that modification. For the moment, we will take Mr. Jones's concession with regard to that. I understand the Company will bring up clauses on the matters I have mentioned. I do not propose to trouble the Committee further on the part of the County Council.

Evidence was then called for the Wandsworth District Board.

Dr. *H. W. Hake*, examined by Mr. VESEY KNOX, said he was Gas Examiner to the Board. The photometer in use was an antiquated instrument; and although he had complained, he had not been able to secure a new one. The ventilation formerly was altogether unsatisfactory; but after a good deal of correspondence, he had secured rather better ventilation of the burner. The Company had always stood by their Act; and therefore the only way to get relief in future was by the insertion of clauses in the Bill. It would be much better to have a testing-station away from the works, because then one would get a sample of the gas actually supplied to the district.

By the CHAIRMAN: There should be two testing-stations at different places away from the works. He tested about once a month; but this fact was not to be taken as indicating satisfaction on his part. He did not think he would gain anything by testing more often at this station. The standard was 14 candles; but on only one or two occasions had he found the gas below 16 candles. The instrument, however, was not scientifically accurate. He thought it recorded a higher illuminating power than was actually the case. The tests for purity, sulphur, and ammonia should be the same as under the Gas Referees. This would be more satisfactory from the consumers' point of view. The Company, as regarded pressure also, should come under the requirements of the Gas Referees. The pressure should be at least 10-10ths at night.

Mr. *Peter Dodd*, Surveyor to the Wandsworth District Board of Works, said the actual area of the streets the Company proposed to close up was 1 acre 2 roods 12 poles. There was a demand, if not for two, at least for one highway; and the Board had arranged to widen Waterside to 40 feet, this being a thoroughfare which led to 7 acres of undeveloped land. They had also arranged with the Electric Light Company, who had works adjacent, to pave Bell Lane.

Mr. *A. R. Gridley*, a member of the Wandsworth Board, said difficulty might arise later, in consequence of the power the Company took to lay mains in private roads (which might be taken over subsequently), if the mains were laid too near the surface, and thus became liable to be affected by steam-rollers, frost, &c. The power of the Company to lay mains in such roads should be subject to the reasonable approval of the Board. The Board should also have authority to approve the re-housing scheme.

Mr. VESEY KNOX then addressed the Committee on behalf of the Wandsworth District Board. The most important point to be dealt with was the standard price, with regard to which the facts were agreed—viz., that 4s. per 1000 cubic feet was a high standard; that 14 candles was a low illuminating standard; and that this was fixed at a time when the population of the district and the output of gas was little more than one-third what it was now. It would be difficult to find a district that had been altered more since the standard price was fixed. If, therefore, it was admissable, as a general principle, that the standard price should be altered where a district had changed, there could not be a stronger case than the present. It was said to be unreasonable that a local authority should ask that the standard price, once fixed, should be altered. When the standard price was settled, there were a number of conditions which went to make the parliamentary contract; one being the illuminating power of the gas. It was obvious that the illuminating power did affect the standard price, because in one case, where the present Committee allowed the Company to alter the illuminating power, they required also a variation of the standard price. As a fact, the Company had supplied gas of higher quality than they were required to do, so that they had not regarded the parliamentary contract fixing the standard price and illuminating power as one to be availed of to the full in a district which was increasing. Before 1880, when the standard price was fixed, the Company had issued, under the old maximum system, £70,000 of stock, which was actually more than half of their stock. The highest aim then was to get 10 per cent. on a portion, and 7½ per cent. on the remainder. But the sliding-scale had altered the parliamentary contract enormously to the advantage of the holders of the stock; so that they had been receiving 15 per cent. in one case and 12½ per cent. in the other. This being so, when the Company came for an increase of capital, it was quite fair for the Committee to say the conditions of the district had altered, and that it was only right the Company should be made to conform, as regarded standard price, to the condition of the rest of the Metropolis, and to the requirements of their district. It was not now contended that the illuminating power should be altered; but as they were forbearing in that respect, and the Company would therefore be able to supply gas without enrichment, it was only reasonable that there should be some alteration—whatever the Committee thought fit—in the standard price. There was also a point with regard to the large capital powers; but that he would not press, if the Committee thought fit to alter the standard price. If the standard price was approximated to that of the South Metropolitan Company, the Board thought nine years might be a reasonable time to allow the Company to stay away from Parliament. If, however, the Committee felt they were not justified in altering the standard price, he asked them to reduce the capital powers to such a figure as would be sufficient for five instead of nine years. Having briefly referred to the subject of laying mains in private roads, and to the rehousing scheme, the learned Counsel spoke as to the roads. It was only reasonable that, if these roads were closed, the Company should make some equivalent. There was no reason for varying the general law to the extent the Company sought. In addition to widening Warple Way, the Company should be required to make a highway to be laid out in consultation with the Board of Works.

Mr. CAUDWELL, on behalf of Battersea, pressed for a reduction of the standard price. If the price were not reduced, there would be two parts of Battersea where the standard illuminating power would be 14 candles; but in one case, where the supply was from the South Metropolitan Company, the standard price would be 3s. 1d., while in the other, where the supply was from the Wandsworth and Putney Company, the standard price would be 4s. per 1000 cubic feet. There should be some approximation of the two limits; and Battersea would be content if the standard of the Wandsworth Company were reduced to 3s. 6d., the illuminating power remaining as at present.

The CHAIRMAN, without calling on Lord Robert Cecil to reply, said the Committee had pretty well made up their minds on this Bill. They had decided that the preamble was proved, subject to the conditions offered by the promoters, and to which the Committee would assent when they saw them in detail in the clauses.

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**Wednesday, May 23.**

Mr. PEMBROKE STEPHENS, on behalf of the Wandsworth Board of Works, said the Board had brought forward several points on which they thought improvement were called for. Some of these points were dealt with by the proposals of the promoters, and on others the Committee decided against the Board. Under these circumstances, the Board felt it would be hardly respectful to raise the same points on clauses. Therefore, as the Board could not usefully take part in the discussion on the clauses, he was instructed to retire.

The Committee then proceeded with the consideration of the clauses: the following being accepted by them as carrying out their decision:—

Further proviso to clause 8: Provided further that the Company shall, where their existing works abut on Warple Way, widen such thoroughfare to the width of 40 feet; and as and when they acquire other property abutting on Warple Way under the powers of this Act, they shall from time to time widen such thoroughfare to the same width.

Clause 37a.—Notwithstanding anything in the Acts of 1856, 1866, and 1880 contained, and for the purposes of the application of the Gas-Works Clauses Act, 1871, the following provisions as to the purity and pressure of the gas supplied by the Company shall have effect (that is to say)—(*a*) All gas supplied by the Company shall be supplied at such pressure as to balance from midnight to sunset a column of water not less than eight-tenths of an inch in height and to balance from sunset to midnight a column of water not less than one inch in height. (*b*) The gas supplied by the Company shall not contain more than 20 grains of sulphur in any form in 100 feet of gas. (*c*) No forfeiture shall be incurred in any case with respect to which it is proved before the Justices that the excess of impurity was occasioned by unavoidable cause or accident, and unless that excess shall amount to 2 grains upon the average of six consecutive week-days, or 10 grains upon any one day. (*d*) In the event of the Gas Examiner finding any such impurity in the gas, he shall forthwith give notice thereof to the Company at their office.

Clause 37b.—In addition to any other prescribed testing-place, the Board of Works for the Wandsworth District (hereinafter called "the District Board") shall, prior to the first day of December, 1900, provide, and thereafter maintain, a sufficient building, or set apart a portion of the Town Hall, Wandsworth, as and for an additional testing-place; and the Company

shall, prior to the first day of January, 1901, provide and erect, and thereafter maintain, in such building, or portion of the said Town Hall, testing apparatus for testing the purity and illuminating power of the gas supplied by the Company, in accordance with the provisions of the Gas-Works Clauses Act, 1871, as varied by this Act; and the District Board shall afford to the Company their officers and servants free access to such testing-place at all times. Such apparatus shall be under the control and management of the Company; and sections 30 and 34 of the Gas-Works Clauses Act, 1871, shall, for the purposes of this Act, be read and have effect as if in section 30 the said testing-place had been referred to in addition to "the premises of the Company," and as if in section 34 the testing "apparatus" had been referred to instead of the testing "place."

Mr. TALBOT said there was only one point in dispute, and that was as regarded the photometer. Mr. Jones, he understood, had said he was ready to accept the most modern form of photometer; and to give effect to this, he (Counsel) proposed a clause that any photometer to be used for the purpose of testing the illuminating power of the gas to be supplied by the Company shall be of the best description known at the passing of the Act, and, failing agreement between the District Board and the Company as should be prescribed by the Board of Trade. It was not desired that there should be a prescription from time to time, but once for all. The Company were already under the Act of 1871; and what they proposed, therefore, was no concession at all.

The clause handed in on behalf of the Company was as follows: "The photometer to be used for the purpose of such testing shall be either of the most improved forms of photometer prescribed by the Gas-Works Clauses Act, 1871, as may be selected by the Gas Examiner of the District Board."

The CHAIRMAN said the idea in the mind of the Committee was that the most modern form of photometer was the one now prescribed by the Gas Referees for the Metropolitan Companies.

Mr. *H. E. Jones* remarked that this photometer was the most recent; but they had not had much experience of it. He objected to it, because it involved the use of pure pentane, which there was difficulty in getting. There were very few of these instruments in use; and there was little knowledge of them.

Lord R. CECIL said Mr. Jones would be quite content to take the best photometer that could be got under the general law of the country; but he wished to maintain that his Company were under the general legislation applying to the whole country, and not that referring specially to the Metropolis.

Eventually the clause, as an addition to clause 37b, was agreed to in the following form:—

The photometers to be used for the purpose of testing the gas supplied by the Company shall be of either of the most improved forms of photometer prescribed by the Gas-Works Clauses Act, 1871, as may be selected by the Gas Examiner of the District Board.

The remaining clauses having been approved, the Bill passed the Committee, and was in due course reported to the House.

# LEGAL INTELLIGENCE.

### The Intimidation of Gas Workers at Newport (Mon.).

At the Newport County Police Court last Saturday week, Evan Lewis Jenkins, the Local Secretary of the Gas Workers' Union, and Osmond Webley and Ivor Birt Jeffries, two of the displaced workmen from the Crindau works of the Newport Gas Company, appeared on remand for unlawfully using threats to John Henry Nicholls, with a view to compel him to abstain from work. As already reported, some new charging-machines have been introduced at the Company's works; and a few weeks ago twenty men were discharged because they would not use the machines. Nicholls, the complainant, who is from Truro, acted as instructor of the new machines, and had lived on the Company's premises owing to threats that he would get a "leathering" if he came out. On the previous Sunday morning, he and another man, named Pascoe, slipped out by the railway siding for a stroll, leaving the line at the bridge, and going over the fields to Caerleon. As they returned on to the embankment, on the way back, they met the defendants. Webley said: "We have met face to face at last," with the addition of a derogatory expression. Then he raised a stick as though he was going to strike, and advanced towards him, but did not strike him. Jenkins then asked why complainant did not come out to see him; and he replied that he did not do so because of the threats. Jenkins asked him to write to his employer at Truro to withdraw him; and complainant said he should get the sack if he went back. Jenkins also told him that no man would stop at the works and be able to live at Newport afterwards, especially the darkies (coloured men), who would not go back alive. Jenkins added that complainant had better clear out as well, and that the Union were picketing the works to cause as much expense to the Company as possible. Jeffries said and did nothing. The three men were each fined 40s. and costs, or in default one month's imprisonment.

**Increase in the Price of Gas at Newcastle.**—The Newcastle and Gateshead Gas Company have notified the Corporations that the price of gas from the June readings will be raised from 2s. to 2s. 4d. per 1000 cubic feet, subject to the usual 10 to 15 per cent. discount. This is partly owing to the fact that the price of coal has gone up nearly 100 per cent.; and the Company felt it imperative, in consequence, to raise the charge for gas by 14 per cent.

**Gas Poisoning at Bingley.**—Stephen Holdsworth (aged 23) died at Bingley last Wednesday from the effects, it is believed, of gas poisoning. The deceased had been in the employment of a firm of printers for the past two or three months; and it seems that on the 15th inst. he replaced the ignition-tube of a gas-engine with a new one. It is supposed that the whole of the feed-pipes were not shut off, and that Holdsworth inhaled a quantity of gas during the operation of replacing the broken tube. Later in the day, the man complained of being unwell, and towards the end of the week his condition became serious, death taking place on Wednesday. The medical opinion is that death resulted from congestion of the brain following upon gas poisoning.

# MISCELLANEOUS NEWS.

## WEST RIDING COALOWNERS AND GAS COAL CONTRACTS.

### The Protest Against the Proposed New Conditions.

In the "JOURNAL" for the 1st inst. (p. 1136), reference was made to an interview which had taken place between representatives of the West Yorkshire Coalowners' Association and of the Gas Committees of the Corporations of Leeds, Bradford, Halifax, Huddersfield, and Keighley, with reference to the new terms of contract for gas coal which the coalowners are seeking to impose. We learn from the "Leeds Mercury," from which the particulars already given were obtained, that the general comment upon the new proposals is that an attempt is being made to relax the conditions which affect the vendor, and to tighten to an unreasonable degree those which affect the purchaser, while it is suggested to advance the contract price of gas coal no less than 5s. per ton. At the interview already reported, a vigorous protest was made by Alderman Lowden, Chairman of the Leeds Gas Committee, against the terms. At the close, it was arranged that the matters in dispute should be further discussed at an adjourned conference; the Corporations to be represented by the Chairman, Vice-Chairman, and Engineer of each Gas Committee, and the coalowners by a Special Committee appointed by them. This adjourned conference took place last Tuesday afternoon at the Great Northern Station Hotel, Leeds. Our contemporary states that each of the new clauses was discussed, and that, on behalf of the Gas Committees, certain modifications were proposed, though it was submitted that the whole list ought to be withdrawn. In reply to a question as to why certain of the proposals were made, it was said that the coalowners desired to protect themselves. It was admitted that they had had no cause to complain, so far as the Corporations represented were concerned; but as to some other purchasers, it was stated that the circumstances were different. With regard to the winter and summer deliveries, it was contended by the representatives of the Corporations that if the 60 and 40 per cent. were insisted upon, 6d. per ton at least should be allowed to meet the extra expenditure which stacking would entail. The object of the coalowners in reducing the winter delivery and increasing that of summer is doubtless that they themselves may be relieved of the necessity of stacking—an arrangement which, it is suggested, would keep the market in a condition more favourable to their interests than it would be with stocks in hand. The conference closed with the understanding that the coalowners would take the proposed modifications into consideration, and let the Committees know whether or not they are prepared to accede to all or any of them. Our contemporary adds that the coalowners are now in a strong position, owing to the large demand for coal; but it is said that the Corporations, and other gas producers, if they have to submit now, will certainly consider the advisability of seeking relief in some other direction, and that possibly endeavours will be made by them to acquire and work the coal they need.

## MANCHESTER CORPORATION GAS SUPPLY.

### Settlement of the Coal Contracts.

At their Meeting last Friday, the Gas Committee of the Manchester Corporation had before them the tenders received for the supply of coal and cannel during the ensuing year. After considering the various offers sent in, the Committee decided upon purchases to the extent of about 250,000 tons, which, with the quantities in hand and to come in under existing contracts, will cover their requirements up to July, 1901. The Committee, we understand, were already pretty well assured for the bulk of the twelve months. The prices at which the new purchases are being made have not been communicated to the Press; but they are considerably in excess of last year's rates, and probably represent an advance about equal to that which coalowners generally are asking on this year's contracts. We learn from the Superintendent of the Gas Department (Mr. Charles Nickson) that the tenders sent in were not so numerous as they were last year, and the quantities offered were considerably less.

## BIRMINGHAM CORPORATION GAS SUPPLY.

### The Annual Report of the Committee.

The Birmingham City Council had before them last Tuesday the annual report of the Gas Committee, and the various recommendations contained therein, as published in the issue of the "JOURNAL" the same day.

Mr. J. H. LLOYD first moved that the Committee be authorized to appropriate £29,821, being the net profit of the department for the year ended March 31 last, to the credit of the improvement rate. He said the Committee thought the accounts very satisfactory, considering the difficulties of the year. They showed a surplus of £29,821, in addition to the £4000 interest on reserve fund, £10,379 in aid of public lighting in the city, £2388 in aid of lighting the courts within the city, and £3490 in aid of the public and the court lighting outside the city; making a total of £50,079 contributed for public purposes from the gas undertaking. The net surplus was £178 less than £30,000—the amount they had hoped to hand over to the rates this year; whereas last year the amount handed over was £320 8s. more than the £30,000. A difference of £499 profit between two years on a turnover of three-quarters of a million was so small that, without explanation, the two years might be assumed to be practically alike. The contrary was the case. They were dissimilar; and the past year had been one of considerable anxiety, owing to the rise in materials and of manufacture. The increased cost altogether was £98,500, made up as follows: Manufacturing £90,250 more, distribution £3150 more, superannuation allowances and sundries £1930 more; and to this must be added £2500 for increased payments for interest on capital and sinking fund, and £660 loss of bank interest—making an exact total of £98,490. The receipts, however, increased also. They had sold £36,000 worth more gas. Residuals had realized £60,000 more, and sundry receipts £2000 more—making an increased total of £98,000, which had enabled the Committee to meet the £98,500 increased

cost, and only decreased the usual £30,000 paid to the rates by £178. The price of gas had been retained at the lowest figures, the net average rate being 2s. 2·07d., notwithstanding a rise in the price of coal in June last of about 1s. 2d. per ton. For some months in the early autumn, it seemed probable that the result would be different; but the increase in the gas used and the rapid rise in residuals had raised the surplus to almost the usual amount. Coke had realized £95,622—the highest amount ever reached by the department; and this fact was largely due to the foresight of the Secretary in inducing the Committee to raise the price rapidly and substantially. The cost of the manufacture of gas had already gone up enormously through the rise of coal; and they did not know that they had even now reached the top. Their contracts for the next twelve months would be made in June, as usual; and if the reported demands of the coalowners were successful, there must undoubtedly be a serious rise in the price of gas. The high price of coke was now beginning to check sales; and they might have to pay increased rates for coal, with diminishing prices for coke. The effect of such high prices in coal would naturally diminish the quantity of gas used. Every shilling per ton put on the price of coal meant, on the present tonnage, £26,715 a year extra cost to the department. All over the country the tendency would be to use more oil where it could be bought at a reasonable figure. There was also a tendency among the larger gas-works to diminish the candle power of the gas. During the great coal strike, their own officials were in favour of temporarily diminishing the illuminating power of gas; but the Committee hesitated. The time might, however, come when they would have to do so. The general progress of the department was good. The increase in the quantity of gas consumed amounted to 395,865,000 cubic feet, or 7·6 per cent. The maximum daily make reached had been 33,546,000 cubic feet; and the maximum weekly make 197,589,000 feet.

Mr. Bishop seconded the proposition, which was adopted.

Mr. Lloyd also moved that the Committee be authorized to borrow such further sums as they may from time to time require for the purposes of the works sanctioned by the Council; the amount not to exceed £500,000. He said that the department had only £45,195 of authorized capital unexpended. This sum was insufficient to meet the remaining requirements for new works, &c. In addition the Local Government Board required the Committee to deal with £175,000 accumulated sinking fund balance. They must either invest it or pay off loans; while hitherto it had been in the business, and had, therefore, been advantageous. The Local Government Board pointed out that this was not precisely in accordance with the wording of the Act. The department had not had to apply for an increase of capital since February, 1883 (seventeen years ago), when the amount of gas sold was half what it was this year. They had, therefore, doubled the output without increasing the capital. The Council would probably like to know some of the objects for which the sum was needed. It was based on the probable requirements of the next ten years. In the report of Feb. 1, 1898, it was stated that the amount intended to be spent in 1900, 1901, and 1902 was £243,000. In addition, he was sorry to say that the plant at Adderley Street was gradually wearing out, and would have to be replaced. This might cost £150,000. The prepayment fittings and stoves for the next ten years were likely to cost £80,000. Ten years' additional mains, based on the average of the last ten years, would amount to £75,000; and ten years' meters, including the prepayment meters, to £150,000. They would also want additional working capital, machinery, stocks, &c., £50,000, and, finally, the item to which he had referred—the £175,000 which the Local Government Board required to be transferred. This totalled to £923,000; and the Committee thought they should have power to borrow £500,000.

Mr. Bishop seconded the motion.

Mr. Lloyd, in answer to a question, said there was already a reserve fund of £100,000 in existence; and this was the maximum amount allowed.

The motion having been adopted, it was resolved that the salary of Dr. Colman, Chemist at the Saltley works, should be increased to £400 per annum.

Mr. Lloyd, in moving the approval of the report, referred to the complaints in the newspapers concerning the department. There was, he said, a great variety of them, and some were very old. The Secretary informed him that there were 100 this quarter as against 50 in the December quarter; but when they compared 100 with 62,500 consumers, the number was not very large. He could see nothing in the complaints to justify the idea that the meters were wrong. Every year about 4000 or 5000 meters were tested; and it was to the interest of the department that it should be so. Many of the complaints appeared to come from people who had not watched their consumption. In one case where complaint was made, it was found that a gas-fire had been put in during the quarter, and in another case several fresh brackets had been put in the house, while in a third there had been serious illness in the house.

Alderman Fallows seconded the proposition.

Mr. Parkins argued that the profits did not compare at all favourably with those of other undertakings. In the charges for gas, there was a disgraceful disparity of £40,000 between the amount charged to small and large consumers. They were charging the mechanics, working men, and small tradesmen too much, and were making them pay for many of the items on the expenditure side of the revenue account. He advocated the adoption of a uniform charge for gas.

Mr. Hennessy contended that the users of the penny-in-the-slot meters were particularly badly treated. The cost of the meters and fittings, and the expenses of collection, were much more than recouped by the interest on the money paid in advance.

Mr. Toller suggested that inclined retorts had been a failure; and with regard to this and other portions of the plant said that the object seemed to be, not to see how much gas could be got out of a ton of coal, but how much coal could be got rid of in a given time.

Mr. Lloyd, in replying, said the reduction of the price of gas to 2s. per 1000 cubic feet to large consumers was specially agreed to by the Council with a view of encouraging the use of gas-engines. The prices in connection with the penny-in-the-slot supply did seem rather large; but they had been arranged by the Committee after a careful consideration of all the data. As to inclined retorts, they had passed the experimental stage, and were almost universally reported to be exceedingly successful. They certainly were very favourable indeed for the men.

## THE PRICE OF GAS AT LEEDS.

The Leeds Corporation Gas Committee last Wednesday decided to recommend the City Council to advance the price of gas by 3d. per 1000 cubic feet on and from July 1 next. The price at the present time is 2s. per 1000 cubic feet; and the increase for the remaining nine months of the financial year will produce about £25,000. This sum will just about cover the anticipated advance in the price of coal to be purchased for use between December and April. The Gas Department have a good stock of coal in hand sufficient to last until towards the end of the year; but this does not remove all difficulty. The coal which is thus available was purchased at an advance of about 1s. or 1s. 6d. per ton; and this is a factor to be reckoned with practically at once. In other words, the coal from which gas will be produced for the next six months alone represents an addition of something like £12,000 to the expenditure. The enhanced values of residuals and the greater consumption of gas for stoves saves the situation somewhat—coke is fetching 4s. per ton more than at the beginning of the year—but, on the other hand, there are higher wages to be paid, and increased rates and taxes, as compared with the position of the department twelve months ago. Only last Wednesday the Gas Committee resolved to advance the wages of the yardmen from 22s. to 24s. per week, of the purifiers from 24s. 3d. to 26s. per week, and of the bricklayers at Meadow Lane works from 9d. to 9½d. per hour.

## STAFFORD CORPORATION GAS AND ELECTRICITY SUPPLY.

### The Past Year's Working.

At the Meeting of the Stafford Corporation last Tuesday—the Mayor (Mr. W. C. T. Mynors) in the chair—the Gas and Electricity Committee presented their report for the year ending the 31st of March. It showed that the total quantity of gas made in the twelve months was 157,853,000 cubic feet, and that sold to private consumers 148,429,000 cubic feet; being an increase of 11,299,000 cubic feet upon the year 1898-9. The leakage and unaccounted-for gas was further reduced from 7·47 per cent. to 5 per cent. In consequence of the enhanced price, and the larger quantity carbonized, coals cost £8330; being an increase of £1064. The manufacturing charges were £4117; being an increase of £329, which was spent upon renewals and alterations of plant. Distribution charges amounted to £785; being an increase of £179. Management cost £547—an advance of £184, due to additional collectors being required in consequence of the large number of new consumers on the prepayment system. The working expenses were £8350. Adding the cost of coals made a total of £16,680, as compared with £14,583; being an increase of £2097. The revenue from the sale of gas and public lighting was £19,974, showing a substantial rise of £1609. The amount received for residual products, after deducting expenses, was: Coke, £3695; tar, £1365; and sulphate of ammonia, £991—a total increase of no less than £1574, which more than compensated for the increase in the cost of coal by £509. The total revenue for the year amounted to £26,122, and the total expenditure was £15,725; leaving a gross profit of £10,397, which was about £850 more than for 1898-9. The net profit was £3646, out of which £500 was paid as an instalment to the district fund. This being the close of the first year of profit-sharing among the workmen, and the accounts being so satisfactory, the Committee set aside a sum equal to 4½ per cent. bonus to all employees on weekly wages, to which under the scheme the men were entitled. The Committee recommended that £2000 should be transferred to the district fund in reduction of rates, in addition to the £500 already paid over, making £2500 for the year; that £500 be placed to the reserve fund; and that the balance be carried forward, out of which will be paid the bonus to employees. The total expenditure upon capital for the gas undertaking has been £105,779, and the capital repaid amounts to £36,707—leaving £69,072 owing; and the total paid out of profits in the reduction of rates will, with this year's contribution, amount to £34,850. The electric energy generated at the electricity works for the year was 118,341 Board of Trade units—being an increase of 19,593 units, or 20 per cent. more than last year; and the equivalent in number of 8-candle power lamps connected is 8558—an increase of 1212. The total revenue from electricity, meter-rents, &c., amounted to £1772; being an increase of £329. As the total expenditure was £983, there was a gross profit of £789. Interest charges on loans amounted to £560, and instalments of principal in reduction of capital to £604; making a total of £1164, and leaving a debit balance upon the year's working of £375. This, *plus* £81 brought forward, must be provided for out of the district fund. In order to further popularize the use of electricity, the Committee have reduced the price to a uniform charge of 5d. per unit, and abolished meter-rents. They are taking steps to augment the productive capacity of the gas and electricity works, in order to be in a position to meet the increased consumption in both departments.

The Engineer and Manager (Mr. J. Ferguson Bell) had prepared his usual analysis of the accounts of the Gas Department, which accompanied the report. It showed that the capital employed last year was at the rate of £4 9s. 11d. per ton of coal carbonized, and 9s. 6d. per 1000 cubic feet of gas sold. The coal used was 15,765 tons; and the quantity of gas made was 157,853,000 cubic feet, of which 148,429,000 cubic feet were sold. On the tonnage basis, the make was 10,013 cubic feet, and the sale 9415 cubic feet. The net cost of coal was 2s. 10·67d.; the total working expenses were 9s. 11·60d.; the gross profit was 11s. 10·31d.; and the net profit 4s. 5 79d. Adding last year's balance, 1·72d., we get 4s. 7·51d. On the basis of the quantity of gas sold, the figures stand as follows: Coal (net), 3·68d. per 1000 cubic feet; total working expenses, 12·7d.; gross profit, 15·12d.; and net profit, 5·72d. Adding last year's balance, 0·18d., we have a total of 5·9d.

The Committee also reported that they had considered the report of the Gas Engineer to the Sub-Committee appointed to look into the question of carburetted water gas, as well as a report of the Sub-Committee; and they recommended that plant for the production of this gas be erected. The Committee examined various tenders obtained for providing and laying down such plant; and, in the event of the scheme being approved by the Council, they recommended that that of Messrs. Humphreys and Glasgow, amounting to £3385 for the principal, and to £2731 for the auxiliary plant, be accepted. To meet the Engineer's

estimated expenditure on the scheme—viz., £8000—and to provide for probable further capital outlay in extension of the gas undertaking, the Committee recommended that application should be made to the Local Government Board for their sanction to the raising of a loan of £10,000.

Mr. Wright expressed his pleasure in moving the consideration of the report, as it showed that the gas undertaking had passed through the most successful year of its existence as part of the property of the Corporation. Having recapitulated the financial details set forth in the report, he went on to say that the Committee did not propose to increase the price of gas, which must be a source of gratification to the consumers, seeing that the charge has been raised in so many places. With regard to the bonus, a scheme had been formulated, but, acting on the advice of the Town Clerk, it had been withdrawn for the present—a legal difficulty having arisen. In preparing the scheme, the Committee were greatly indebted to Mr. George Livesey, the Chairman of the South Metropolitan Gas Company. In return for the bonus, the Committee expected to receive attention to their work, and regular attendance from the employees on weekly wages; and they hoped that it would be a strong bond between the Committee and the workmen, and that all concerned would pull together for the benefit of the works. In consequence of the increased demand for gas which had been made year by year, the Committee were face to face with the necessity of putting down additional plant. They had taken every step they considered possible to arrive at what was best to be done. The manufacture of water gas had, of late years, made rapid strides; and, on the recommendation of their Engineer and Manager, the Committee took up the consideration of the question, and had presented a report thereon. If they extended the coal-gas plant, the probability was that the retort-house would have to be enlarged and a new gasholder erected. The cost of this would make a big hole in £20,000. On the other hand, carburetted water-gas plant could be put down for something like £8000. Members of the Committee had visited certain places for the purpose of inspecting carburetted water-gas plants; and, after giving full and careful consideration to the question, the Committee had come to the conclusion that the proper thing to do was to instal this plant. The increasing consumption of gas was due to the growing use of cooking-stoves, and its extending use in factories. Therefore the Committee were obliged to look ahead. Having enumerated the advantages of water-gas plant, the speaker went on to say that it would be seen the Committee proposed to send out the water gas with the coal gas to the extent of 30 per cent. All the gas undertakings of note in the country, where extensions were necessary, were putting down this plant, and the Sub-Committee were convinced that it was the proper thing to do at Stafford. While the Committee had given £2500 from the Gas Department in relief of the rates, there was a deficiency of about £500 on the Electric Light Department, and it was charged to the district fund. The result was really very satisfactory, because the debit balance from the previous year was £513, so that there was an improvement of £140 on the year. He had now to make a regrettable announcement. They were about to lose the services of their Engineer; and he was sure that every member of the Council would congratulate him on the appointment he had received at Derby. It had always been Mr. Bell's desire to give the members every information in his power; and in him they had a most efficient and a most energetic and painstaking Manager. They could all hope that Mr. Bell would have long life, and go on improving his position in the gas world.

After some conversation on the subject of the decision to introduce water-gas plant, which resulted in an amendment to refer the matter back to the Committee being lost by 17 votes to 4, the report was adopted.

## SALES OF STOCKS AND SHARES.

At the Mart, Tokenhouse Yard, E.C., last Wednesday, Mr. Alfred Richards conducted an important sale of gas and water stocks and shares. The first lots offered consisted of a new issue of £4500 of ordinary 5 per cent. stock of the Plymouth and Stonehouse Gas Company (last dividend 6½ per cent.). They were sold at the rate of £120 per cent.; the total realized being £5400. Some fully-paid £10 ordinary shares in the West Surrey Water Company (last dividend 6½ per cent. per annum) were next put up, and fetched £16 10s. and £16 17s. 6d. Ten fully-paid £5 "B" shares in the Romford Gas Company (last dividend 9 per cent.) were sold for £9 10s. per share. A few £5 shares in the Horley District Gas Company, Limited, on which 3½ per cent. has been paid, went for £4 apiece. Some original consolidated stock of the Southend Gas Company, paying 5½ per cent., fetched £111 and £112. A small parcel of £1 shares in the Buntingford Gas and Coke Company, Limited, carrying 5 per cent. dividend, were sold for £1 3s. each. Some £10 "A" shares in the Waltham Abbey and Cheshunt Gas Company (last dividend 7½ per cent. per annum) fetched £15 5s. each; some "B" shares of the same nominal value, carrying 5½ per cent. dividend, realizing £13 each. A £5 share in the St. Margaret's Gas Company, Limited, on which 6 per cent. was paid last year, was purchased for £5 12s. 6d. Some "B" stock of the Barnet District Gas and Water Company (last dividend 8 per cent. per annum) was sold at the rate of £200 per cent.; some "C" stock, carrying 1 per cent. more, realizing £227 10s. per cent.; and some "D" (water) stock, the last dividend on which was at the rate of £6 6s. per annum, £150 per cent. Some 4 per cent. perpetual debenture stock of the Tottenham and Edmonton Gas Company fetched £107 10s. per cent.; consolidated "A" stock (6 per cent.), £125 and £126; do. "B" stock (4½ per cent.), £101. A few £10 shares in the Woking Water and Gas Company were sold for £10 10s. each. A parcel of £100 of 4 per cent. perpetual debenture stock of the Colney Hatch Gas Company changed hands at £107 10s. A few £10 "A" shares in the Harrow and Stanmore Gas Company (last dividend 8 per cent.) fetched £16 and £16 5s. apiece; some £10 "C" shares realizing £12 5s. The last lot sold was some £10 shares in the South African Lighting Association, Limited, on which 10 per cent. per annum has been paid for several years. They fetched £16 each.

At a sale at Wrexham yesterday week, some £10 shares in the Wrexham Gas Company realized up to £16 2s. 6d. each, £100 consolidated stock in the same Company produced £220, £100 consolidated stock in the Wrexham Water Company made £175, and £50 consolidated stock in the Brymbo Water Company fetched £54. At Bromsgrove on Tuesday, 400 "B" £10 shares in the Bromsgrove Gas Company, bearing dividend at the rate of 7 per cent., were disposed of at prices ranging from £10 8s. to £11 2s. 6d. At a sale at Lewes on the same day, 30 lots of £20 original capital stock of the Lewes Gas Company sold for £40, and 27 lots at £39. Nine original fully-paid £25 shares in the Lewes Water Company fetched £80 each; and 23 new £25 shares, created in 1869 and 1883, were sold at prices varying from £50 to £48. For twenty-four twenty-fifths of a £25 share, created in 1891, £65 was given. Ten new £25 shares in the Company, also created in 1891, were sold at £69, £68 10s., and £68. Some original £25 shares in the Winchester Water and Gas Company, with accruing dividends, were also disposed of on Tuesday at from £59 to £60 per share. The dividends on these shares have for many years past been at the rate of 10 per cent. per annum. Some £25 "A" shares in the Dorking Gas Company were sold on Wednesday at £115 and £116 apiece; original shares in the Water Company fetching £34 and £36 each. At Cranleigh, on the same day, some £10 shares in the Cranleigh Gas Company, Limited, were disposed of at prices ranging from £10 to £10 3s. per share. At a sale at Colchester on Friday, original "A" £20 shares in the Colchester Gas Company realized £49 10s. each, and new "B" shares £34 and £34 5s. each.

## THE GAS SUPPLY OF NEW YORK.

The latest indication respecting the situation of the gas supply of New York City was given, says the "American Gaslight Journal," at the recent annual meeting of the Standard Gaslight Company. It appears that the gathering was in every sense harmonious; the Board of Directors remaining unchanged, except for the substitution of Mr. J. U. Brookman for Mr. Russell Sage as President—whose "involuntary resignation" took place some time ago. The reports submitted showed that the Company had largely increased their business, and that they were prepared to expend a considerable sum of money to still further extend their trade in the city district north of the Harlem River. The tenour of the annual statements also supported the contention that money was to be made by selling gas at 65 c. per 1000 cubic feet. Our contemporary remarks that it could, of course, be said that there would have been more in gas at the legal rate of $1·05; but the shareholders were granted the privilege of thinking this out for themselves. A review of the proceedings at the meeting, so far as it could be made by one who did not share in its deliberations, would seem to indicate that the controllers of the Company are in at least fair sympathy with the aims of those who direct the fortunes and property of the Consolidated Gas Company. If such is the case, the legitimate successors to the property of the New York and East River and Equitable Gaslight Companies will, it is expected, shortly have a hard time in making both ends meet. For if the Standard Company confess to making little profit at 65 c. per 1000 cubic feet, where is the New Amsterdam Company to come in? Bonds are the securities which must prevail under modern financial laws. Of these the Consolidated Company have virtually none, the Standard but few, and the New Amsterdam many. The situation in the gas supply of New York City is stated to be reaching the critical stage; and the signs of the times go to show that regularity and honour, as evinced in the course pursued by those who direct the affairs and control the fortunes of the Consolidated Company, are about to prevail.

## ELECTRIC LIGHTING NOTES.

The Rhyl District Council have agreed to accept certain tenders, amounting to £16,543, for executing different sections of their electric lighting scheme. They have also allocated £250 for land, and £2206 for legal expenses and other charges. Application is to be made to the Local Government Board for a loan of £19,000.

The Gloucester Corporation have already spent £43,450 on their electric lighting undertaking; and they now require a further £9425 for extensions and £8575 for the erection of a refuse destructor. At an inquiry on Thursday, it was stated that applications had already been received for 13,350 lights; and the extensions would bring up the capacity of the works to 20,000 lights.

Those leisured people the Yeadon District Council spent a further three hours last Tuesday discussing the electric light question. Grievous to relate, the talk at times was of a personal nature; and two of the members said very hard things about each other. If the topic of electric lighting causes people to use unkind words one to another, that is a good reason to add to the several others why it should be left alone. The Yeadon Councillors wound up their animated proceedings by deciding to ask the Board of Trade to extend the time of the Council's Provisional Order, and also to ask the Leeds City Council if they were prepared to supply electricity in bulk to Yeadon in conjunction with the proposed tramway scheme.

An inquiry, which occupied some six hours, was held by Colonel Slacke at Maidstone last Tuesday, in respect of an application by the Corporation for the authority of the Local Government Board to the borrowing of £40,000 with which to carry into effect an electric lighting and dust destruction scheme. To the second part of the scheme there was strong opposition from influential ratepayers; and ultimately it was thought wise to withdraw it. This decreased the amount required to £34,000. There was also considerable opposition on financial grounds. The price of gas in the town is low—2s. 4d. per 1000 cubic feet; and many ratepayers are of opinion that the electric lighting undertaking will prove a financial failure.

Last Wednesday, Mr. W. A. Ducat, a Local Government Board Inspector, sat at the Municipal Offices, Keighley, to inquire into an application by the Corporation for sanction to the borrowing of £45,000 for works of electric lighting. It was stated that the estimated expenditure included £31,460 on plant and buildings, £3146 Engineers' expenses and contingencies (10 per cent.), £9122 cost of site to be purchased from the Gas Department at Low Bridge, and £1250 cost of first twelve months' running—making a total of £44,978. The proceedings were in the main formal, though the Inspector seemed very anxious to know how it was the Gas Committee proposed to charge the Electricity Department £9122 for land which already belonged to the Corporation.

## METROPOLIS WATER SUPPLY.

### The Carrying Out of the Intercommunication Scheme.

At the Guildhall, Westminster, on Monday last week, Mr. Charles Perrin, the Official Examiner under the Metropolis Water Act, held an inquiry in reference to the scheme of general intercommunication between the works of the Metropolitan Water Companies authorized by the Metropolis Water Act, 1899.

Mr. A. T. LAWRENCE, Q.C., and Mr. LEWIS COWARD appeared for the associated Water Companies; Mr. FREEMAN, Q.C., and Mr. DALDY represented the London County Council.

Mr. LAWRENCE, in opening the case, said the scheme provided for intercommunication between the different Companies, the utilization of the Battersea works of the Southwark and Vauxhall Water Company as a central station, and the provision of pumping plant and filter-beds at Hampton. From this source there would be a supply of several million gallons of water a day to any of the Companies who needed it. Under the scheme an approximate quantity of 10 million gallons a day could be supplied, if necessary, to the Chelsea Company, 22 millions to the East London Company, 19 millions to the Grand Junction Company, 12 millions to the Kent Company, 18 millions to the Lambeth Company, 20 millions to the New River Company, 20 millions to the Southwark and Vauxhall Company, and 19 millions to the West Middlesex Company. There had already been an expenditure upon the works executed to the extent of £155,754; and a further outlay of £472,233 was about to be incurred, which would bring up the total cost to £627,987.

The following witnesses gave evidence in support of the scheme and as to the estimated cost of the works: Mr. E. Collins, Distributing Engineer of the New River Company; Mr. Walter Hunter, Engineering Director of the Grand Junction Water Company; Mr. W. B. Bryan, Engineer of the East London Water Company; Mr. J. W. Restler, Engineer of the Southwark and Vauxhall Water Company; and Mr. T. F. Parkes, Engineer of the Lambeth Water Company.

Mr. FREEMAN, for the London County Council, said they were not there in any hostile spirit to oppose the scheme; and if the Companies could satisfy the Local Government Board that what they were seeking legitimately came within the purview of the Act of 1899, and that the estimates were reasonable, the Council would not object to their carrying out the works contemplated.

Mr. LAWRENCE briefly replied, and the inquiry closed.

## THE LONDON COUNTY COUNCIL AND THE WATER QUESTION.

### An Explanatory Report by the Parliamentary Committee.

At the Meeting of the London County Council last Tuesday, the Parliamentary Committee presented a long report reviewing in some detail the proceedings which led to the rejection, on the 29th of March, of the Council's Bill for the purchase of the undertakings of the London Water Companies, and the subsequent withdrawal of their Welsh Supply Bill. Towards the close of their report, the Committee said: "We regret that the Government has not thought fit to avail itself during the present session of the results of the labour and money expended by the Council, especially having regard to the offers as to modifications which have been made on behalf of the Council. These offers of compromise not having been accepted, however, it will be necessary shortly for the Council to consider anew what action it should now take in the matter. It must be noticed that in advising the rejection of the Council's Bill, the Government gave no indication that they would themselves deal with this question; but we presume that if the opportunity afforded by the session of 1901 is not to be lost, so far as the question of obtaining a settlement with regard to this long outstanding matter is concerned, the Government will in the near future give some indication of what they propose to do." The Chairman of the Committee (Mr. E. A. Cornwall) dealt at length with the history of the water question. He said he thought the Council had some right to expect that their Bills would have been fully considered this session. The Royal Commission on Water Supply had clearly reported in favour of purchase by a public authority. It was grossly unfair that the Council's Bills were not allowed to go to a Committee. Some people thought and said that the Progressive party wished to acquire the water undertakings for the aggrandisement of the London County Council; but he would tell them that the Council could have been the water authority in 1895 and again in 1896. They were, however, not prepared to sell the ratepayers by giving the terms which the Companies desired. Mr. H. P. Harris pointed out that it was not true to say that the Council had generally accepted the recommendations of the Royal Commission. The Bills of the Council differed very considerably from the report of that Commission; and with regard to the question of the authority, none of the proposals to bridge over this difficulty had been effective. Mr. M'Kinnon Wood said it was the monstrous report of the Moderate party suggesting a Water Trust which had obscured the question ever since Mr. Cohen, M.P., said that the action of the Moderate members in the House of Commons had been the same as that which they had taken in the past, and which they had always stated in the Council they intended to take. If the Progressive party had supported the report of the Royal Commission, the matter would soon have been settled. Sir A. Arnold remarked that the report of the Royal Commission was worse than dead, for none of the authorities round London had indicated their consent to its terms. The policy of the Council held the field, and, in his opinion, it would ultimately be adopted. Mr. Westacott pointed out that at all events the outside counties had declared that they would never be under the domination of the Council. He protested against the waste of the ratepayers' money in promoting such Bills as those introduced this session, and pointed out that up to the present the Council had expended no less than £56,440 on the water question. Mr. Shaw Lefevre expressed the belief that the Trust proposed by the Royal Commission was absolutely impossible. The Council had no security whatever that the Government would take up this matter next session;

## GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 1423.

| Issue. | Share | When ex-Dividend. | Dividend or Dividend & Bonus. | NAME. | Closing Prices. | Rise or Fall in Wk. | Yield upon Investment. |
|---|---|---|---|---|---|---|---|
| £ | | | p.c. | GAS COMPANIES. | | | £ s. d. |
| 590,000 | 10 | Apl. 11 | 10½ | Alliance & Dublin 10 p.c. | 20—21 | .. | 5 0 0 |
| 100,000 | 10 | ,, | 7½ | Do. 7 p.c. | 13½—14½ | .. | 5 3 5 |
| 800,000 | 100 | Jan. 2 | 5 | Australian 5 p.c. Deb. | 102—104 | .. | 4 16 2 |
| 200,000 | 5 | May 16 | 6 | Bombay, Ltd. | 6—6¾* | .. | 4 12 4 |
| 40,000 | 5 | ,, | 6 | Do. New, £4 paid | 4—4¼* | .. | 5 6 8 |
| 880,000 | Stk. | Feb. 23 | 12 | Brentford Consolidated | 250—260 | .. | 4 12 4 |
| 270,000 | ,, | ,, | 9 | Do. New | 185—190 | .. | 4 14 9 |
| 50,000 | ,, | ,, | 5 | Do. 5 p.c. Pref. | 140—145 | .. | 3 9 0 |
| 159,375 | ,, | Dec. 14 | 4 | Do. 4 p.c. Deb. | 118—123 | .. | 3 5 1 |
| 220,000 | Stk. | Mar. 14 | 11½ | Brighton & Hove Orig. | 235—240 | .. | 4 15 10 |
| 226,320 | ,, | ,, | 8½ | Do. A. Ord. Stk. | 175—180 | .. | 4 14 5 |
| 999,500 | Stk. | Feb. 23 | 5 | Bristol, 5 p.c. max. | 125—130 | .. | 3 16 11 |
| 420,000 | 20 | Mar. 29 | 10 | British | 39—40 | −½ | 5 0 0 |
| 50,000 | 10 | Feb. 23 | 12 | Bromley, Ord. 10 p.c. | 24—26 | .. | 4 12 4 |
| 79,000 | 10 | ,, | 9 | Do. 7 p.c. | 19—21 | .. | 4 5 8 |
| 500,000 | 10 | May 16 | 6 | Buenos Ayres (New) Ltd. | 9—9¼* | .. | 6 6 4 |
| 220,000 | Stk. | Dec. 29 | 4 | Do. 4 p.c. Deb. | 99—101 | .. | 3 19 3 |
| 150,000 | 20 | Mar. 14 | 8½ | Cagliari, Ltd. | 24—26 | .. | 6 6 11 |
| 100,000 | 10 | Sept. 29 | 8 | Cape Town & Dis., Ltd. | 14—15 | .. | 5 6 8 |
| 50,000 | 50 | May 2 | 6 | Do. 6 p.c. 1st Mort. | 55—57 | .. | 5 5 3 |
| 550,000 | Stk. | Apl. 11 | 13½ | Commercial Old Stock | 275—285 | .. | 4 14 9 |
| 236,425 | ,, | ,, | 10½ | Do. New do. | 210—220 | .. | 4 15 5 |
| 238,237 | ,, | Dec. 14 | 4½ | Do. 4½ p.c. Deb. | 141—144 | .. | 3 2 6 |
| 800,000 | Stk. | Dec. 14 | 9 | Continental Union, Ltd. | 155—165 | −2½ | 5 9 1 |
| 200,000 | ,, | ,, | 7 | Do. 7 p.c. Pref. | 175—180 | .. | 3 17 9 |
| 51,600 | Stk. | Feb. 23 | 14 | Croydon A 10 p.c. | 335—340 | .. | 4 2 4 |
| 173,400 | ,, | ,, | 11 | Do. B 7 p.c. | 265—270 | .. | 4 1 5 |
| 555,000 | Stk. | Feb. 23 | 5½ | Crystal Palace Ord. 5 p.c. | 116—120 | .. | 4 7 6 |
| 60,000 | ,, | ,, | 5 | Do. 5 p.c. Pref. | 130—135 | .. | 3 14 1 |
| 486,090 | 10 | Jan. 26 | 11 | European, Ltd. | 19—20 | .. | 5 10 0 |
| 354,060 | 10 | ,, | 11 | Do. £7 10s. paid | 14—15 | .. | 5 10 0 |
| 14,993,075 | Stk. | Feb. 9 | 4.5/0 | Gas-light and Coke | 4 p.c. Ord. | 95—97 | −½ | 5 1 0 |
| 2,600,000 | ,, | ,, | 3½ | | 3½ p.c. max. | 96—98 | .. | 3 11 5 |
| 3,799,735 | ,, | ,, | 4 | | 4 p.c. Con. Pref. | 116—118 | −1 | 3 7 10 |
| 3,993,975 | ,, | Dec. 14 | 3 | | 3 p.c. Con. Deb. | 96—99 | −½ | 3 0 7 |
| 70,000 | 10 | Nov. 15 | 8 | Hongkong & China, Ltd. | 13½—14½ | .. | 5 10 4 |
| 2,800,000 | Stk. | May 16 | 10 | Imperial Continental | 202—205* | .. | 4 17 7 |
| 473,600 | Stk. | Feb. 9 | 3½ | Do. 3½ p.c. Deb. Red. | 100—103 | .. | 3 8 0 |
| 75,000 | 5 | Dec. 14 | 6 | Malta & Medn., Ltd. | 4¾—5¼ | .. | 5 14 3 |
| 560,000 | 100 | Apl. 2 | 5 | Met. of Melbourne | 5 p.c. Deb. | 105—109 | .. | 4 11 9 |
| 250,000 | 100 | ,, | 4½ | | 4½ p.c. Deb. | 105—107 | .. | 4 4 1 |
| 541,920 | 20 | Nov. 15 | 3½† | Monte Video, Ltd. | | 10½—11½ | .. | 6 1 8 |
| 667,946 | Stk. | Feb. 23 | 9½ | Newc'tle & Gatesh'd Con. | | 215—220 | .. | 4 4 1 |
| 299,855 | Stk. | Dec. 29 | 3½ | Do. 3½ p.c. Deb. | | 104—107 | .. | 3 5 5 |
| 150,000 | 5 | May 16 | 8 | Oriental, Ltd. | | 7—7¼* | .. | 5 6 8 |
| 135,000 | 5 | ,, | 8 | Do. New, £4 10s. pd. | | 6½—6¾* | .. | 5 6 8 |
| 15,000 | 5 | ,, | 8 | Do. do. 1879, £1 pd. | | 1¼—1¾* | .. | 4 11 5 |
| | | | | | | * Ex. div. | |

| Issue. | Share | When ex-Dividend. | Dividend or Dividend & Bonus. | NAME. | Closing Prices. | Rise or Fall in Wk. | Yield upon Investment. |
|---|---|---|---|---|---|---|---|
| £ | | | p.c. | GAS COMPANIES. | | | £ s. d. |
| 60,000 | 5 | Feb. 23 | 7 | Ottoman, Ltd. | 5—5½ | .. | 6 7 3 |
| 500,000 | 100 | Dec. 1 | 6 | People's Gas of Chicago 2nd Mtg. Bonds | 102—106 | .. | 5 13 2 |
| 851,070 | 10 | Apl. 27 | 7 | River Plate Ord. | 10¼—10¾ | .. | 6 10 3 |
| 250,000 | Stk. | Dec. 29 | 4 | Do. 4 p.c. Deb. | 100—102 | .. | 3 18 5 |
| 250,000 | 10 | Apl. 11 | 8 | San Paulo, Ltd. | 11½—12½ | .. | 6 8 0 |
| 185,000 | Stk. | Mar. 14 | 10 | Sheffield A. | 245—247 | .. | 4 1 0 |
| 209,053 | ,, | ,, | 10 | Do. B. | 244—246 | .. | 4 1 4 |
| 447,427 | ,, | ,, | 10 | Do. C. | 244—246 | .. | 4 1 4 |
| 5,600,000 | Stk. | Feb. 23 | 5½ | South Metrop., 4 p.c. Ord. | 124—127 | +1 | 4 3 11 |
| 1,520,000 | ,, | Jan. 12 | 3 | Do. 3 p.c. Deb. | 98—100 | .. | 3 0 0 |
| 380,940 | Stk. | May 16 | 5 | Southampton Ord. | 115—120* | .. | 4 3 4 |
| 70,825 | ,, | Dec. 29 | 4 | Do. 4 p.c. Deb. | 120—125 | .. | 3 4 0 |
| 120,000 | Stk. | Mar. 14 | 6 | Tottenham and Edmonton A. 5 p.c. B. 3½ p.c. 4 p.c. Deb. | 120—125 | .. | 4 16 0 |
| 250,520 | ,, | ,, | 4½ | | 93—98 | −2 | 4 11 10 |
| 55,100 | ,, | Dec. 14 | 4 | Tuscan, Ltd. | 7—8 | .. | 6 5 0 |
| 182,380 | 10 | Jan. 12 | 5 | Do. 5 p.c. Deb. Red. | 101—104 | .. | 4 18 2 |
| 149,900 | 10 | Jan. 2 | 5 | | | | |
| | | | | WATER COMPANIES. | | | |
| 780,399 | Stk. | Dec. 29 | 11 | Chelsea, Ord. | 305—310 | .. | 3 11 0 |
| 150,000 | ,, | ,, | 5 | Do. 5 p.c. Pref. | 157—162 | .. | 3 1 9 |
| 160,000 | ,, | ,, | 4½ | Do. 4½ p.c. Pref. '75 | 145—150 | .. | 3 0 0 |
| 175,785 | ,, | Mar. 29 | 4½ | Do. 4½ p.c. Deb. | 145—150 | .. | 3 0 0 |
| 1,720,560 | Stk. | Apl. 11 | 7 | East London, Ord. | 188—193 | −2 | 3 12 6 |
| 654,740 | ,, | Dec. 29 | 4½ | Do. 4½ p.c. Deb. | 145—150 | .. | 3 0 0 |
| 390,000 | ,, | ,, | 3 | Do. 3 p.c. Deb. | 99—101 | .. | 2 19 5 |
| 700,000 | 50 | Dec. 14 | 7½ | Grand Junction 10 p.c. max. | 102—105 | −1 | 3 11 5 |
| 310,000 | Stk. | Mar. 29 | 4 | 4 p.c. Deb. | 130—135 | .. | 2 19 3 |
| 708,000 | Stk. | Feb. 23 | 14 | Kent | 307—312 | .. | 4 9 9 |
| 160,000 | ,, | ,, | 7 | Do. New, 7 p.c. max. | 200—210 | .. | 3 6 8 |
| 1,043,800 | 100 | Dec. 29 | 10½ | Lambeth, 10 p.c. max. | 290—295 | .. | 3 11 2 |
| 406,200 | 100 | ,, | 8 | Do. 7½ p.c. max. | 207—212 | .. | 3 15 6 |
| 350,000 | Stk. | Mar. 29 | 4 | Do. 4 p.c. Deb. | 130—133 | .. | 3 0 2 |
| 500,000 | 100 | Feb. 23 | 13½ | New River, New Shares | 415—420 | .. | 3 4 3 |
| 1,000,000 | Stk. | Jan. 26 | 4 | Do. 4 p.c. Deb. | 132—137 | .. | 2 18 5 |
| 902,300 | Stk. | Dec. 14 | 7½ | Southwark and Vauxhall 7½ p.c. max. 5 p.c. Pref. | 195—200 | .. | 3 15 0 |
| 126,500 | 100 | ,, | 7½ | | 185—190 | .. | 3 18 11 |
| 489,200 | Stk. | ,, | 5 | | 160—165 | .. | 3 0 7 |
| 1,019,585 | ,, | Apl. 11 | 4 | 4 p.c. A Deb. | 129—134 | .. | 2 19 9 |
| 1,155,066 | Stk. | Dec. 14 | 10 | West Middlesex | 283—288 | .. | 3 9 5 |
| 200,000 | ,, | ,, | 4½ | Do. 4½ p.c. Deb. | 147—152 | .. | 2 19 3 |
| 200,000 | ,, | Mar. 14 | 8 | Do. 3 p.c. Deb. | 99—101 | .. | 2 19 5 |
| | | | | | *Ex div. | | |

† Next dividend will be at this rate.

and the gravest possible injustice would be done to London if the purchase of the water undertakings was allowed to be carried out by any other body than the Council. Mr. Burns, M.P., said the money which Mr. Westacott had mentioned as having been spent by the Council in promoting Water Bills was the price they had to pay for having a syndicated Administration in office, a monopoly Government in power, and a Moderate party at Spring Gardens playing the game of the Water Companies. The only public authority which could possibly take charge of the water supply of London was the Council, which was the equivalent of the 800 Corporations throughout the United Kingdom, and should be treated in the same way. After a few remarks from Mr. Beachcroft, the report was received.

## THE WATER SUPPLY OF BIRMINGHAM.

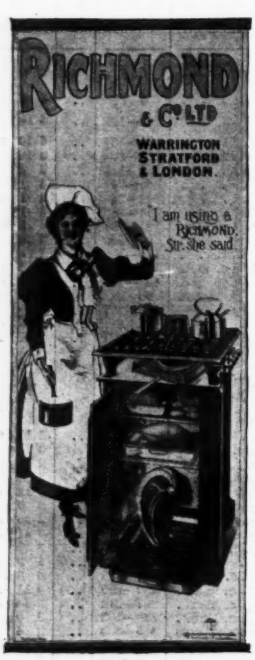
### Annual Report—The Elan Valley Works.

The annual report of the Water Committee was submitted at the meeting of the Birmingham City Council last Tuesday.

The report showed that the water-rents for the year increased by 5·14 per cent., against 4·56 per cent. in the previous year. The cost of pumping advanced by £3711, being due, not only to the greater quantity of water pumped, but to an increase in the unit of cost per 1000 gallons. This was more than accounted for by the rise in the price of coal; and, according to present appearances, the unit of cost would be further largely increased by this cause in the current year. The accounts also showed a considerably greater expenditure on maintenance of engines and boilers, in consequence of the thorough overhauling and repair of the plant at all the stations. The profit and loss account exhibited an adverse balance of £6479, which had been written off against the special water fund in accordance with the Act of 1892. This result was due to the growth in the charges for interest in consequence of the expenditure of capital on the Elan supply works. In the parliamentary financial forecast, the result of the year's operations was estimated to show a deficiency of £20,438; so that the realized result was £13,959 better than the forecast. The special water fund possessed a balance of £124,975, against £100,185 in the forecast. Notwithstanding the restrictive measures adopted, which reduced the consumption in the latter part of the summer, the quantity of water distributed showed an increase of 6 per cent. over the quantity for the previous year. The consumption of water on measured supplies increased by 8 per cent., and on the domestic and unmeasured supplies by 5·4 per cent. Taken on the usual basis of five persons to a house, the population in supply on March 31 was 753,970; being an increase of 3·1 per cent. over the population in supply at March 31, 1899. The endeavours of the Committee to find temporary sources of supply had met with no success; and the measures adopted for increasing the yield of the present sources have given disappointing results. If the experience of the last two years was repeated this summer, further measures of compulsory curtailment of supply would be imperative; but the Committee would only introduce an intermittent supply as a last resource. They appealed to consumers to exercise the most rigid economy during times of drought. Regarding the Elan Valley works, the report stated that the weather of the past winter had not been favourable for the execution of the works; and consequently comparatively little progress had of late been made with the building of the various dams. At Caban Coch, the excavation for the middle portion of the dam had been completed, and the building of that section commenced. At Careg-ddu, the dam itself was now complete; and the viaduct over it was making good progress. At Pen-y-gareg, the wall was built up to 55 feet below the crest; and at Craig Goch to 40 feet below the crest. A start had been made on the portion of the aqueduct to be carried out by administration. This Dol-y-mynach tunnel must be finished before the Caban reservoir was filled, and was therefore now being pushed on with three eight-hour shifts a day. The preparations for the work had led to a reconsideration of the proposals for constructing the dam at Dol-y-mynach—that was, the next reservoir on the Claerwen above Caban Coch. This dam was not included in the first instalment of the works as they were originally undertaken; it having been proposed to divert the Claerwen water into the tunnel by means of a temporary weir. The site of the dam would be submerged when the Caban reservoir was full; and if the construction of the dam was postponed as originally proposed, it would be necessary to lower the water in the Caban reservoir very considerably, so as to clear the site when the time for construction arrived. The Committee had therefore given instructions to the Engineer to proceed with the foundations and building of the dam up to a level of 830 feet above Ordnance datum—that was 8 feet above the top water-level of the Caban reservoir, leaving the remainder—70 feet—to be built when the second instalment of the works was undertaken. The cost of the works thus transferred from the second to the first instalment was estimated at £82,200. The amount expended on the works in the Elan Valley during the year ended March 31 last was £170,219—giving a total of £829,132. With regard to the aqueduct, the Committee stated that Messrs. John Aird and Sons' contract—Elan to Dolau—was now practically finished. On Messrs. Morrison and Mason's contracts—Dolau to Knighton, Knighton to Downton, Downton to Cleobury Mortimer, and Cleobury Mortimer to Hagley—work was proceeding, although the progress was not so rapid as could be desired. In connection with the Severn crossing, it had been found that the strata lying above the solid rock on the east side of the river were deposited at such an angle, and were in their nature so treacherous, as to render them entirely unsuitable as a support for the back of the abutment and wing walls of the bridge, or for the support of the pipes. The Engineer considered it necessary that the whole of the bridge abutments should be carried down to the solid rock, and that a cast-iron tunnel should be laid to contain the syphon-pipes. The Committee regretted the extra cost which would be caused by this alteration, which, however, it was impossible to foresee, and which could not be dispensed with. The amount involved was £29,070.

Alderman Lawley Parker, in moving the adoption of the report, stated that the department were paying £10,000 a year more for coal now than twelve months ago.

The report was adopted.




## COAL PRICES TO GO HIGHER IN SUMMER.

It is almost certain, the *Morning Leader* thinks, that 30s. a ton for coal will be passed before long. For a month or two the price may possibly drop to 29s., supposing there is a fine summer; but in August the almost unbroken steady rise of twelve months will again continue its career.—*Westminster Gazette, May* 9, 1900.

**We shall be glad to provide Gas Departments with TRAINED INTERVIEWERS (Ladies or Gentlemen), to impress this on their Consumers, and to show that GAS, although advanced in Price, is cheaper than COAL as a Fuel. Please communicate with us if you decide to increase your Day and Summer Consumption.**

**May we refer you to Gas Departments in all parts of the United Kingdom, as to Methods and Results?**

## THE TONBRIDGE LOCAL AUTHORITIES AND THE WATER COMPANY'S ORDER.

### Consent Dispensed With.

Among the applications for Provisional Orders in the present session is one by the Tonbridge Water Company for power to construct further works, extend their limits of supply, sell water in bulk, raise additional capital, and for other purposes. The promoters were unable to obtain the consents of the Tonbridge Urban District Council, the Sevenoaks Rural District Council, and the Penshurst Parish Council, which were necessary; and they asked the Board of Trade to exercise the powers conferred by section 4 of the Gas and Water Works Facilities Act, 1870, of dispensing therewith. The Board thereupon appointed Mr. Ingram B. Walker as Commissioner to hold a public inquiry at Tonbridge with reference to the application, and to report to them on the matter (*ante*, p. 884). At the inquiry, the promoters stated that they no longer proposed to include the parish of Penshurst within their limits, and consequently the consent of the Parish Council and of the Rural District Council (the Road Authority of that parish) became no longer necessary. The consent of the Urban District Council was required in view of the powers sought by the promoters for the construction of additional works. The objections urged by the Council did not, in the main, relate to these works; and Mr. Walker reported to the Board of Trade that, in his opinion, the increase in the population demanded a larger supply of water, and that the works proposed should be authorized. After considering Mr. Walker's report, the Board decided to dispense with the consent of the Council, and to grant an Order subject to certain modifications and amendments.

## KIMBERLEY WATER-WORKS COMPANY.

The Annual Meeting of this Company was held on Monday last week, at the Cannon Street Hotel, E.C.—Mr. J. Jackson in the chair.

The Secretary (Mr. W. Vincent) having read the notice convening the meeting, the report of the Directors was presented. It contained extracts from a special report by the Manager, explanatory of the effect of the war and the working of the undertaking in the past year. In the course thereof, he stated that the quantity of water sold was 116,747,884 gallons; being a reduction of 16,750,092 gallons as compared with the previous year. The whole of this falling off could be attributed to the war. Up to the end of September, they had, as compared with the figures for the first nine months of 1898, sold 1,155,807 gallons more; and as the weather continued dry to the end of the year, it was expected that this increase would have been fully maintained. From the 15th of October the town was put on short allowance, but for which the sales would have been fully 3 million gallons better than they were for the year 1898.

The Chairman, in moving the adoption of the report, apologized for the absence of the Chairman (Mr. A. J. Macdonald) through serious illness, and went on to say that the past year had given the Directors endless anxiety respecting the state of the Company's property. In addition to the importance of the town as a centre of population and the site of the richest diamond mines in the world, the presence of Mr. Rhodes rendered Kimberley an attractive objective to the Boer forces from the outset of the war. However disadvantageous his presence might have been as a bait to the enemy, it had been more than compensated for by the brilliant services rendered by him and by the employees of the great enterprise over which he presided. Within a few hours of the entrance of General French into Kimberley, the Directors received the welcome intelligence that the property of the Company was practically safe, and that it had sustained only comparatively little injury. He thought that all interested in the concern might congratulate themselves on their good fortune in this respect. The damage to the Company's business, so far as the Directors could at present judge, was confined to a loss of stores to the amount of £1700, and injury to plant and buildings to the extent of £800. Provision for this had been made in the balance-sheet. There had also been a decrease of £5000 in their takings, directly owing to the war. The figures in the report of their Engineer showed several satisfactory features, all tending in the direction of increased economy. Of the falling off of 17 million gallons in the consumption, 15 millions were attributable to the decreased requirements of the mines. Dealing with the commercial aspect of the Company's affairs, he said the profit made amounted to £23,827. Adding to this £818 interest on investments, and £5000 taken from the contingent fund, they had an amount of £29,646 to be dealt with. Of this sum, £5976 had been absorbed in interest on debentures and debenture stock; £685 represented the usual items of depreciation; £2500 was reserved for losses (the greater part of which they hoped to recover); £958 was written off as depreciation on investments during the year; and the dividend of 5 per cent. for the year would absorb the balance, £15,750. The war, which for the last seven or eight months had been devastating South Africa, appeared to be approaching a satisfactory issue. From the outset the Company had had a prosperous career in Kimberley, under the free institutions of a British colony; and they might reasonably expect to have a fair share of the generally increased prosperity of the country that must accrue from the conversion of the mischievous little States on our borders into component parts of the Empire.

Mr. C. Critchett seconded the motion; and, after a short discussion, it was carried unanimously.

In consequence of the large expense incurred in opposing in Parliament the Exmouth Water Company's Bill, the Budleigh Salterton District Council find that a rate of at least 3s. 6d. in the pound would be necessary in the current financial year in order to discharge the whole of their liabilities. This would mean a heavy drain upon a large number of ratepayers; and therefore it has been resolved to apply to the Local Government Board for sanction to pay off the whole or part of the parliamentary expenses by way of a loan.


# SAWER & PURVES,

(BRANCH OF METERS LIMITED),

Telegraphic Address: "SAWER, MANCHESTER."

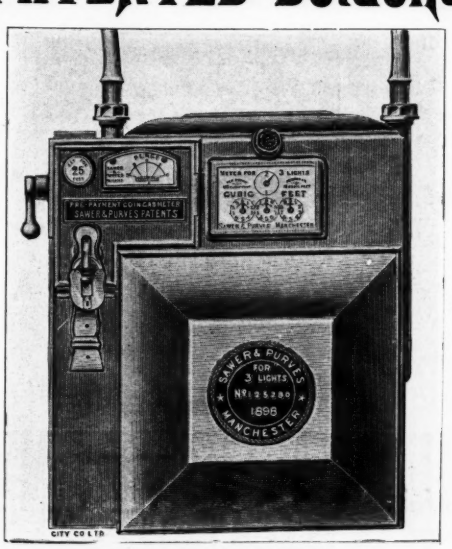
National Telephone: 3289 MANCHESTER.

NELSON METER WORKS, MILES PLATTING,

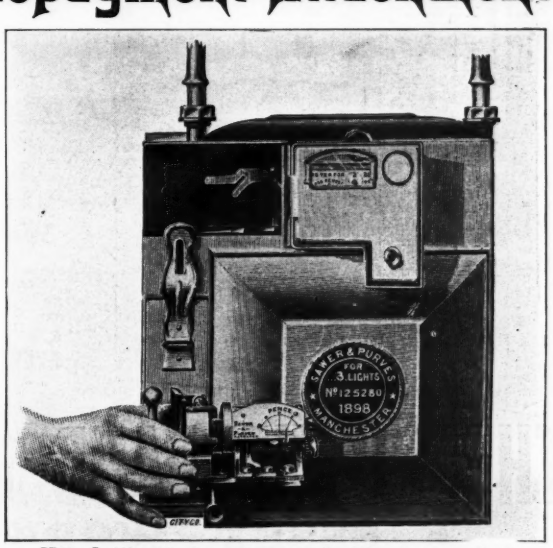
**MANCHESTER.**

**Makers of Meters fitted with**

# PATENTED Detachable Prepayment Attachment.




**Meter in working position.**




**Meter with attachment removed without uncoupling**

## NOTES FROM SCOTLAND.

**From Our Own Correspondent.**

*Saturday.*

For the vacant gas managership at Perth a short leet of seven was first made, and now this has been cut down to three: Mr. D. Easson, of Maybole, Mr. W. B. M'Lusky, of Selkirk, and Mr. A. Waddell, of Broughty Ferry. Mr. Easson was for many years Assistant-Manager at Perth under Mr. Whimster. The appointment is to be made on Monday.

It was reported to the Peebles Gas Commissioners, at their meeting this month, that the increase in the output of gas during last month was equal to 24·6 per cent., and that since the financial year began, the total increase in the output has been 4,328,000 cubic feet. The annual make is 14½ millions. This increase, for a town of the size of Peebles, is phenomenal. Mr. Williamson, the Treasurer to the Commissioners, read the conditions of what he said had been rather inaptly described as a bonus scheme, but which was simply the adoption of a piecework system in connection with the make of gas. During the year, he said they had paid £47 more in wages than they did in the previous year. Then Mr. Williamson proceeded to refer to the comments which I made upon the scheme when it was introduced, and which, he thought, were not quite warranted by anything which was put forward by the Commissioners. "The correspondent stated," he said, "that the object the Commissioners had in view was to induce the men to produce a greater quantity of gas out of every ton of coal than they had hitherto done. Any such scheme as that would be a great benefit; but it had passed the wit of the Commissioners meanwhile. The correspondent further said it was not a good thing, and betokened suspicion of the men engaged in the works. On the contrary, they highly appreciated the workmen. It was simply an effort to bring a system of piecework into operation in a gas-works; and he did not see any reason why it should not be carried through. If there should not be such a great make of gas next year, the men would not receive so much pay. If they worked harder, they would receive more pay—always in proportion to their work." In further speaking to the scheme, Mr. Williamson "explained that the work varied. At some periods, there was not sufficient work to justify taking on a man. Then the men had to fill extra retorts; and when the time came, an extra man was taken on, when the work became lighter again. Under the scheme, the men would have a return for the harder work." In reply to a question, the Manager (Mr. A. Bell, junr.) said that the men were highly in favour of the scheme, and liked the idea of being paid in a lump sum. I may say that the scheme is that the Commissioners pay the men 3¾d. for every 1000 cubic feet of gas they produce. As it is not known what quantity of gas may be produced (required) until after it is produced, the men are paid a stated wage; and then, at the end of a certain period, they receive the balance. This is what is meant by the lump sum. I cannot say that I like the scheme yet. If, technically, it be not a plan for the getting of more gas per ton of coal, it is now admitted to be a device for inducing the men to work harder at times. In other words, instead of the Commissioners being at the loss of half of a man's wages, by paying whole wages when there is only half work, the loss is to be put upon the men, one set of whom, inside the works, are to be called upon to work harder in order to keep another set of men from being taken on. The scheme was adopted. It is very ingenious; but its foundation is not very stable. Not only will it create hostility among workmen, as a class, but if ever there should be an abnormal reduction in the output of gas, the scheme would go to pieces, because, while the men are in favour of receiving a lump sum at the end of the year, it is not to be expected of them that they would tolerate, not only a reduction of their stated wage, but also a demand for the refunding of a proportion of their wages overpaid.

The Town Council of Cupar have come to terms with the Gas Company as to the public lighting. The Company have hitherto undertaken the duty of working the lighting department. They now decline it; and the Town Council are to take it over. The gas consumed is to be paid for by the Corporation at a rate 17½ per cent. under that charged to ordinary consumers. This is very liberal; and it was gratifying to observe that it was so regarded by the members of the Town Council, in agreeing to the terms.

The Stonehaven Gas Company held their annual meeting on Monday. It was reported that there had been a total income of £2385, and an expenditure of £1637. The profit was £748. Out of it, a dividend was paid at the rate of 3s. per share; and a balance of £230 was carried forward. The Chairman (Mr. T. Mitchell) said that since their last annual meeting they had lost the services of a very valuable official, by the lamented death of their late Manager, Mr. Ross. He had been connected with the Company all his life; and during the last 35 years had been their faithful and trusted Manager. The balance-sheet which had been set before them was a very satisfactory one. The increase in the quantity of gas sold had been considerable, amounting to about 10 per cent., or £173; while the increase in the sale of tar, &c., had been £35. This was the largest increase they had had up to the present time. With such increases all round, they might have made larger profits; but they had to pay a higher price for coal, and this they had done without making a corresponding increase in the price of gas. On the whole, the concern was in a thoroughly sound condition.

A branch of the Gas Workers and General Labourers' Union was "organized" at Brechin on Wednesday night, by a Mr. Blackwood, from Glasgow, the General Secretary for Scotland of the Union. About forty members joined. It is not said how many of these were gas workers, and how many general labourers; but it may be assumed that if ever any action be taken by this branch, it will be the gas-works, and not any work in which general labourers are employed, that will be its object. Mr. Blackwood recommended the organization as, in his opinion, the largest and wealthiest of its kind in the world. "Of its kind" was, for the speaker, a very safe phrase, seeing that there is not another organization similar to it to be found.

Mr. John M'Andrew, who gives no address, writes a problem letter regarding the Paisley Corporation gas undertaking, which, as I do not understand, I give as it appeared in the "North British Daily Mail" on Tuesday last. It was as follows: "Being somewhat in touch with our


SUTHERLAND'S

PATENT

PREPAYMENT GAS-METERS

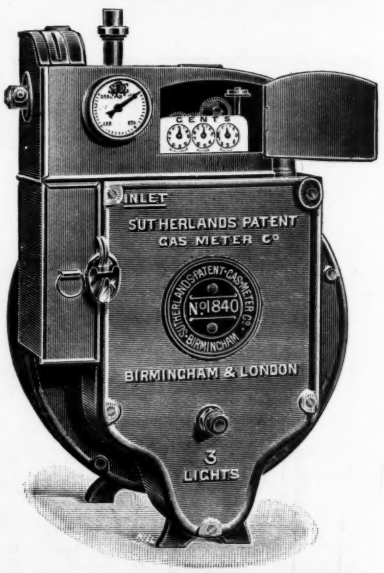
SPECIAL FEATURES:

Accuracy of Measurement.

Simplicity of Construction.

Excellency of Workmanship and Material.

EVERY METER GUARANTEED.




THE SUTHERLAND GAS-METER COMPANY

ESSEX WORKS, BIRMINGHAM.

# New Sunlight Incandescent Company,

LIMITED.

Telegrams:
"IGNIFLUOUS, LONDON."

Telephones:
"947 HOLBORN."
"1403 "

33 & 34, SHOE LANE,
LONDON, E.C.,

*March 26th*, 1900.

DEAR SIRS,

We regret that the persistent misrepresentations of our competitors force us to engage in that most unprofitable of all occupations, a paper warfare. The latest advertisement of the Welsbach Company, of the same character as many others issued by them, is our excuse for troubling you with the following statement. This will be **very categoric.**

## MANTLES.

We draw your attention to the following:—

The monopoly under the Welsbach Master Patent expired 11th December, 1899.

The monopoly under the Welsbach 1886 Patent expired 12th March, 1900.

The monopoly under the Welsbach 1893 Patent has never yet been established, although in use by the Company for more than seven years past.

Mr. Justice Buckley's Judgment on the 1886 Patent, as we have already explained to you, **IS A MATERIAL STEP TOWARDS THE VICTORY** which we confidently await on the 1893 action. We are evidently not alone in this opinion, for we find that, whereas before the Welsbach attack on Sunlight Mantles and our attack on the Kern Burner, Welsbach Ordinary Stock **stood at 96,** it has gradually dwindled, as our fights with them have proceeded, until **it now stands at only 48.**

We hope that the Mantle action will be brought to a hearing immediately after Easter. It is meantime retarded **by the extreme reluctance of the Welsbach Company to answer the Interrogatories** we wish to administer to their chief officers as to their **alleged user of the patented prescription before it became a patent,** necessitating repeated applications to the Court by us. We have also applied to the Court, and succeeded in obtaining an order for a Commission to proceed to Vienna to extract the truth in this matter.

Quite apart from the question of the validity of the Welsbach 1893 Patent, we would again call attention to the fact that **Sunlight White Mantles** are made under patents belonging to us, by a new process, entirely different from that of the Welsbach Company; and we have satisfied ourselves most fully that **they do not infringe in any particular.**

## BURNERS.

As to Burners we simply point out that the Judgment of the Court of Appeal has shown that **AS A RESULT OF THE INVESTIGATION** made by the Welsbach Company when they bought the Kern Patent, it was decided to purchase the De Mare Patent **"IN ORDER TO PROTECT THE KERN."** Protection was hardly necessary unless infringement was apprehended; and by the Judgment in our favour above referred to, they have lost this protection.

In point of fact the De Mare form of Burner **made absolutely to the original drawings,** and declared by the Welsbach Company to be nothing but a crude suggestion, produces a better result than can be obtained by any Kern Burner we have yet been able to buy on the market, and **does it by simpler means.** It embodies, in fact, absolutely new and original features based upon a very simple application of well-known scientific principles.

## ONE WORD FOR PRACTICAL PEOPLE.

We are offering broadcast to supply our **SIMPLEX** (De Mare) Burners in exchange for the Kern Burners, and **TO AWAIT PAYMENT** until **THE DECISION OF OUR CASE AGAINST THE WELSBACH COMPANY.**

We challenge that Company to do the same with their Mantles!!

Yours faithfully,

NEW SUNLIGHT INCANDESCENT CO., LTD.
L'CE FLETCHER,
*Secretary and General Manager.*

LONDON: Printed by WALTER KING (at the Office of King, Sell, & Railton, Ltd., 12, Gough Square); and published by him at 11, Bolt Court, Fleet Street, in the City of London—Tuesday, May 29, 1900.

over-bepraised gas-works, I have no desire whatever to draw a wet sponge over the face of an old friend. I simply wish to place before your many readers in this quarter the true bearing of the case as shown by the annexed figures, a clear and honest front. I find that it is proposed by a Committee of the Gas Commissioners to deviate from an ordinary mercantile practice to convey to the so-called stock capital the amount of £8705 for extension of the works, actually paid away a sum that truly belongs to the expenditure account, and relieve the pressure on said account, and thereby to show surplus balance that had no existence. Indeed, the amount paid for the extension of the works does not nearly bear a fair equivalent of gas made, or quality of gas given. This is by no means fair. The borrowing powers does not constitute a right of tampering with figures that represent an amount paid out for work done. Such is the method that has been acted on, year after year, since 1884. True, fancy often lends a charm to fiction all for glory and a fair fame, that a favourable return and a rosy hue may be given to the management. I offer the following details that may interest your many readers; Gas record for eleven months ending April 30, 1900: Coals received, 40,541 tons; coals carbonized, 38,729 tons; average price per ton, 12s.; amount, £23,278 8s. Gas made, including 9,882,000 cubic feet from oil and coal, 373,473,000 cubic feet. Wages and salaries, £14,716, for the eleven months. Financial record: Total income, including drawings from the bank, £56,166; also including temporary loans and mortgages, also payment to the bank (this is charged in the expenditure account), and then £8705 for extension to the works, £109,449; total expenditure, including extension of works, &c., £109,226 —balance at credit on 11 months' work, £223. I find that on April 30, 1900, a sum quoted as owing to the bank amounting to £11,280; also gas-rents received, £30,561; arrears, £4205—£34,766. For coals and wages alone the amount exceeds the drawings by £3228 8s. This is by no means a healthy state of affairs." No notice has been taken of the communication.

The Edinburgh Town Council on Thursday agreed to a recommendation by the Electric Lighting Committee, that the charge for electric current be advanced from 3½d. to 3⅝d. per unit for lighting; that the charge for public lighting be reduced from £14 to £13 per lamp; and that the charge for current for motive power remain at 1½d. per unit. Bailie Mackenzie, the Convener, said that the estimated surplus for the coming year was £4285. The increase in the price, he explained, was due to the great increase in the price of coal and the large capital expenditure upon the new station. It had been suggested to him that the increase in price should have been ¼d. per unit. The Committee discussed this; but the majority thought that possibly the larger rise might have the effect of decreasing the consumption and applications, and in this way increasing the evil it was intended to remedy. Some members of the Committee expressed a fear that too little provision was being made for the reserve fund, considering the large capital involved; but it should not be overlooked that, of the money spent during the last two years—over £300,000 —a large part had gone into work not very perishable (land, buildings, subway, copper strip, and solid cable), while the machinery and plant obtained in these two years might be said to be just started, so that in reality it was only the more perishable portions of the early plant that need be considered at the present stage.

The Treasurer's Committee of the Water Committee of the Glasgow Town Council on Thursday of last week submitted their estimate of the revenue and expenditure from May 31, 1900, to May 31, 1901, based upon the current rates and charges. The total estimated expenditure in connection with the water-works was £220,221, with a probable credit balance of £8111—making a total of £228,332. The estimated revenue was £205,612, with a probable credit balance for the year 1899-1900 of £22,720—making a total of £228,332. The General Committee recommended (1) that the amount of the domestic water-rate to be assessed and levied within the limits of compulsory supply for the year 1900-1901 be continued at 5d. per pound; (2) that the amount of the domestic water-rate beyond the limits of compulsory supply be continued at 10d. in the pound; (3) that the rate to be charged for the same period against proprietors in terms of the City of Glasgow Act, 1891, for pumped water supplied for domestic purposes beyond the limits of compulsory supply, be reduced from 7d. to 6d. per pound; (4) that the public water-rate be continued at 1d. in the pound; and (5) that the tables of rates and charges, and terms and conditions of supply, for water to be supplied for other than domestic purposes (including the hydraulic power supply) during the year 1900-1901 remain the same as for last year. The report was adopted, on the motion of Mr. Carswell; a counter proposal for a remit to consider whether water supplied beyond the compulsory area should not be reduced from 7d. to 6d. per pound only receiving the support of five members.

## CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *May* 26.

**Sulphate of Ammonia.**—The week opened with an active market; and a considerable business was done at the western ports. Later, a quieter tone supervened; but the closing quotations are £11 5s. to £11 8s. 9d. per ton, delivered f.o.b. at the ports. Supplies have not been over plentiful; and the firmness of makers, who have not much to dispose of, has somewhat checked business. On the other hand, urgent orders having for the most part been covered, buyers seem again disposed to hang back. There is still good inquiry for delivery over the summer months. But buyers will only operate at a discount on spot values; and meantime makers are firm at £11 10s. per ton, f.o.b. Leith.

**Nitrate of Soda** is a shade easier; the closing quotations being 8s. 3d. per cwt. for ordinary, and 8s. 6d. for fine, quality.

LONDON, *May* 26.

**Tar Products.**—With the exception of pitch, most of the other products are weak, and but little business passing. Pitch itself is fairly stiff; but the price is to some extent nominal. As very little business is doing, creosote and oils are easier, and are being talked to lower figures still. Benzols are not at all active; but the increase in the number of inquiries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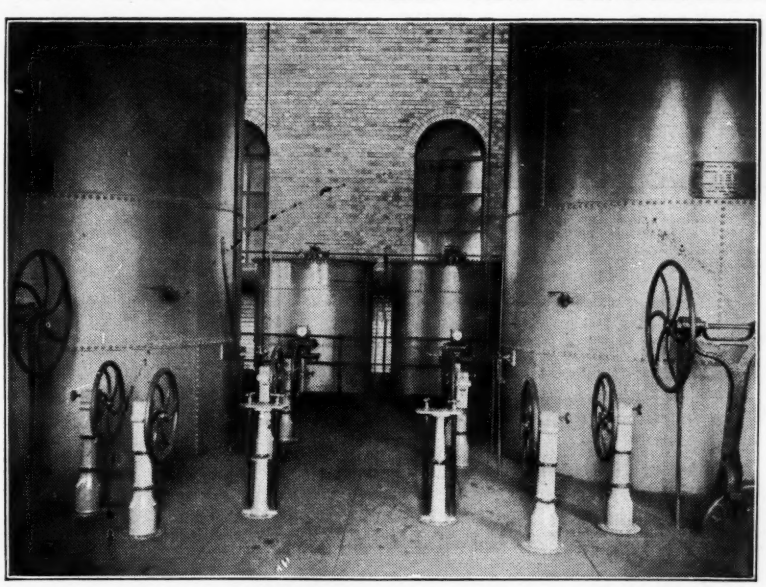

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for forward delivery looks as though buyers expected an improvement rather than the reverse.

Values obtaining during the week are: Tar, 17s. 6d. to 27s. 6d. Pitch, east coast, 38s.; west coast, 35s. Benzols, 90's, 6d.; special qualities for gas, 8d.; 50's, 8¼d. Toluol, 1s. 1d. Solvent naphtha, 1s. 1d. Crude naphtha, 3¼d. Heavy naphtha, 1s. Creosote, 2¾d. Heavy oils, 3¼d. Carbolic acid, 50's, 2s. 3d.; 60's, 2s. 9d. Naphthalene, 55s. to 75s. Anthracene, "A," 4d.; "B," 3d.

**Sulphate of Ammonia.**—The improvement of last week is still maintained; and business ranges from £11 5s. to £11 10s. per ton, less 3½ per cent.

## COAL TRADE REPORTS.

### From Our Own Correspondents.

**Lancashire Coal Trade.**—No further change of any moment can be reported in the position generally throughout the coal trade of this district. As stated last week, the acceptance by the Railway Companies of the 5s. per ton advance over last year, has virtually decided the position with regard to other contracts. During the past week, the Manchester Gas Committee have settled for their supplies of gas coal—subject to the Council's approval—at a "considerable advance" on last year's rates, the amount of which is not stated. A large business is also steadily being put through in other quarters; and in all these cases the full advance of 5s. over last year is being obtained without difficulty. With regard to other descriptions of fuel, the better qualities of round coal are beginning to hang somewhat, and here and there are accumulating in stock, but not as yet to any large extent. In fact, at some collieries the output is still short to supply deliveries for all the requirements of customers; and in one or two cases even house-fire coals are being bought from outside districts. Common round coals continue in brisk inland demand, for steam and forge purposes; and there is also an active inquiry for slack. But supplies of this description of fuel are more plentiful on the market, owing to surplus quantities coming in from Staffordshire and Yorkshire; and as these are obtainable at under the prices quoted by Lancashire collieries, stocks of engine fuel are in some cases accumulating in waggons on the pit-sidings. Prices, however, at Lancashire pits are all through fully maintained at late rates; and notwithstanding the competition of slack, collieries prefer to hold stocks which they consider will be more than wanted during the approaching Whitsuntide stoppages of the pits, rather than attempt to push sales at lower figures. At the pit, prices range from 13s. and 13s. 6d. per ton for common, to 14s. 6d. and 15s. 6d. for best house coal, 13s. for steam and forge coal, and 10s. 6d. to 11s. 6d., according to quality, for slack. Shipping business continues slow; and though the official rates have been reduced to 14s. 6d. per ton for unscreened, and 15s. 3d. for screened coal, delivered at the Mersey ports, these prices are scarcely being readily obtained, with collieries outside the Association offering at less. Coke continues in pressing request, with prices firm.

**Northern Coal Trade.**—There has been a slight reduction in the production of coal this week, due to the local rejoicings; and this and the approaching holidays, seem to have stiffened the prices. There is a steady demand for fuel generally; and the collieries are now working fully. Best Northumbrian steam coals are from 18s. 6d. to 19s. per ton f.o.b.; and steam smalls continue rather scarce at from 13s. to 13s. 6d. In the gas coal trade, the demand is still very large, there being an increased export of gas coals to some of the northern ports; so that little or no effect is felt from the reduction of the local consumption. Best Durham gas coal is quoted at from 17s. to 17s. 6d. per ton f.o.b. One or two additional contracts have been concluded of late; but they have not been of large extent, and there is very little variation in the prices. This time the coalowners seem to have been able to command the market; and they have generally asked the price that has been named. In the coke trade, there is continued activity and high prices. Gas coke is very firm, and in one or two cases the prices have been raised; but the larger contracts will probably not be fixed until nearer the end of the half year. About 16s. per ton may be taken as the medium f.o.b. price for gas coke in the Newcastle district.

**Scotch Coal Trade.**—Coal has been scarcer, on account of the miners having worked shorter hours, in an effort to introduce an eight-hour working day. Prices have, however, only been nominally affected. A very strong demand continues. The quotations are: Main 14s. to 14s. 3d. f.o.b. Glasgow, ell 15s. 6d. to 16s. 6d., and splint 15s. 6d. to 16s. The shipments for the week amounted to 225,054 tons—a decrease of 10,192 tons upon the previous week, but an increase of 35,467 tons upon the corresponding week of last year. For the year to date, the shipments have been 3,885,569 tons—an increase of 856,223 tons upon the same period of last year.

**Wages of Leeds Gas Workers.**—The wages of the purifiers employed at the Leeds Gas-Works have been raised from 24s. 3d. to 26s. per week, and an increase of 2s. has been added to the weekly pay of the yardmen; making the wages of the latter 24s. a week. The advance, which is subject to confirmation by the Council, has been given in compliance with an application made on behalf of the men some time ago by Mr. J. E. Smith, the District Secretary of the Gas Workers' Union.

**Malta and Mediterranean Gas Company, Limited.**—At the meeting of this Company on the 12th prox., the Directors will report a satisfactory increase in the sale of gas, in the revenue from residual products, and from fittings and meters, in the year ending March 31 last. On the other hand, there has been an increase in the cost of coal, as well as under the head of taxes incurred at the Sicilian stations. From the available balance, the Directors recommend the declaration of the usual dividends upon the first and second preference capital, and a dividend of 4 per cent. upon the ordinary capital; making, with the interim dividend of 2 per cent. paid in December last, 6 per cent. for the year, and leaving a balance of £312 12s. 5d. to be carried forward to the next accounts.


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**Heywood and Middleton Water Undertaking.**—The annual report of the Heywood and Middleton Water Board has been issued. The Water Engineer (Mr. James Diggle) states that, after making provision out of revenue for sinking funds, amounting in the whole to £2902, there remains a deficiency of £386 upon the year's working, against £411 in the previous year. This deficiency would have been converted into a substantial profit if the bank rate of interest had not been so excessively high, and had no special payments been made to the Corporation of Rochdale for purchase of water, and also to the millowners on Naydon Brook for deficient supply of compensation water during the drought last summer. In the district supplied by the Board, there are 13,462 consumers; and the net income for the year was £20,362 7s. 7d.

**The Present Condition of the Coal Market.**—The "Iron and Coal Trades Review" says that "a great deal of nonsense" is being talked in the daily Press on the subject of the present situation in the coal trade, which is generally described as one of "famine." Our contemporary acknowledges that there is a large demand for coal, and that prices are high, but assures its readers that "there is no greater demand, and prices are no higher, than three months ago, and coalowners have not this year realized such high values for coal as in some cases they did last year." The writer goes on to say: "Prices, however, are too high to be entirely satisfactory. The cost of fuel is reacting unfavourably on industries generally, and there is a widespread belief that the present values cannot be maintained much longer. All such pious opinions are of little value. No one knows what may happen next. In the meantime, many large consumers—gas companies, railways, and others—are working on short contracts, believing that we are near the beginning of the end of the present coal boom."

**The Coal Production of the World.**—Last Thursday, a return was issued to an order of the House of Commons, dated the 9th ult., showing the production, consumption, and export of coal, and the number of persons engaged in the first named work, in the principal countries of the world, in each year from 1883 to 1898. It appears therefrom that the quantity of coal yielded by the five most important coal-producing countries in the first named year was as follows: United Kingdom, 163,737,000 tons; Germany, 55,943,000 tons; France, 20,759,000 tons; Belgium, 18,178,000 tons; United States, 102,868,000 tons. In 1898, the totals had risen to 202,055,000, 96,310,000, 31,826,000, 22,088,000, and 196,406,000 tons. This was the last year for which definite statistics were obtainable, but the following provisional figures are given for 1899: United Kingdom, 220,085,000 tons; Germany, 101,622,000 tons; France, 32,331,000 tons; Belgium, 21,918,000 tons; United States, 218,376,000 tons. The average value per ton at the pit's mouth in the above-named countries for 1898 was: 6s. 4¼d., 7s. 4½d., 9s., 8s. 9½d., and 4s. 5d. The average price of British coal at the pit's mouth for the past year was not procurable at the date of the report; but the average, including coke, patent fuel, &c., per ton exported (f.o.b. from the United Kingdom) during the last three years was 8·98s., 9·92s., and 10·72s. These figures show continuous rise, which has been still more marked during the first four months of the present year, in which the average export price has been no less than 15·5s. per ton.

**A Second Main from Thirlmere to Manchester.**—The Water Committee of the Manchester Corporation have decided to bring the question of laying a second main from Lake Thirlmere for the conveyance of water to the city before the City Council. The cost is estimated at between £400,000 and £500,000.

**The Winsford District Council Propose to Purchase the Gas-Works.**—At the meeting of the Winsford District Council last Thursday, a letter was read from the Secretary of the Over and Wharton Gas Company, Limited, stating that the Directors were prepared to sell the undertaking on a valuation by Mr. Thomas Newbigging, subject to the approval of the shareholders. In 1894 Mr. Newbigging reported on the matter; and in a letter about the same period, he advised the Council to purchase the undertaking. It was agreed that the Company be written to, stating that the terms of their letter were acceptable.

**Additional Storage for the Lytham Gas-Works.**—Colonel A. J. Hepper, R.E., lately held an inquiry at Lytham into an application of the District Council for power to raise £2200 for gas-works purposes. The Clerk (Mr. C. A. Myers) stated that the present gasholder had a storage capacity of 144,000 cubic feet, and it was proposed to add another lift which would bring it up to 270,000 cubic feet. Mr. W. Newbigging stated that during the past ten years the consumption of gas at Lytham had increased 107 per cent.; the quantity made in 1888 being 18 millions, and in 1898 41 millions. The increase in the sale of gas for the year ending March, 1899, over the previous year, was 20·76 per cent.; while for the past year it was at the rate of 38·70 per cent. This was much greater than the average rate of increase throughout the kingdom for the same period—viz., 5 per cent. It was therefore inevitable that the proposed extension would be necessary. The addition would increase the total gasholder capacity to 414,000 cubic feet.

**Barnoldswick Gas and Water Supply.**—We have received from the Clerk to the Barnoldswick Urban District Council (Mr. Charles Thornton) a copy of the year-book for 1900-1901, which has been prepared for the use of the members. We learn therefrom that the amount originally authorized (in 1893) to be borrowed for gas-works purposes was £14,200; the loan being for a period of 32 years. Of this sum, £12,842 is outstanding. A further sum of £1500 was sanctioned in 1895, and of £1524 two years ago, of which a small portion, with interest, has been repaid. Various sums, amounting in all to £11,277, have been borrowed on account of the water-works, a considerable proportion of which is still owing. The quantity of gas made in the year ending March 31 last was 19,520,700 cubic feet; being an increase of 2,002,700 cubic feet, or at the rate of 11·4 per cent., on the make in 1898-9. The quantity sold was 18,228,800 cubic feet, of which 12,801,700 cubic feet was for lighting, 3,911,500 cubic feet for cooking, heating, and motive power, and 1,515,600 cubic feet through automatic meters. The total accounted for was 18,573,000 cubic feet; showing a loss of only 4·8 per cent. The price charged is 3s. 6d. for lighting and 3s. for cooking, &c., with a discount of 3d. The quantity of coal carbonized was 2085 tons; the residuals produced being 133 tons 5 cwt. of tar and 173 tons 4 cwt. of ammoniacal liquor. The revenue from the gas-works in the past year was £3568; from the water-works, £1349.


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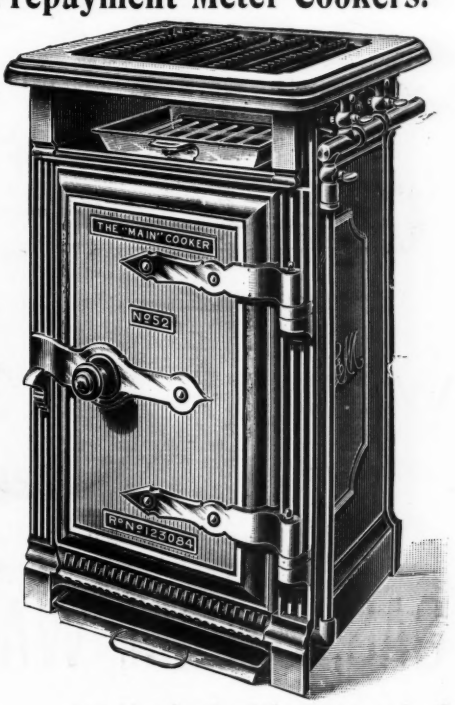


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**Birmingham's New Reservoir at Frankley.**—About fifty of the members of the Birmingham Association of Mechanical Engineers have been to Frankley to inspect the Corporation new water-works; and the greatest interest was evinced by them in the undertaking. They found that the reservoir covers an area of 25 acres, with a depth of about 32 feet, and will have a holding capacity of 200 million gallons. The main walls are nearing completion; the men now being engaged in lining them with blue bricks. The bed of the reservoir is being asphalted; and the work appears to be well in hand. Several of the filter-beds are close upon finished.

**Coventry Corporation Water-Works.**—The annual report of the Coventry Corporation Water Committee states that, owing to a change in the date of collection, the receipts for the past year show a decrease; but as £2500 was outstanding at the end of the financial year which will fall into the receipts for the current year, the balance will be redressed. The expenses for the year increased by about £400. They included £600 on account of repairs to the engines at Spon-end, which are still in progress. There is a balance, after providing for all capital charges, of £1213. There is also a large sum in hand; and so the Committee recommend the Corporation to make a grant of £3000 this year in aid of the borough fund.

**Newbury Corporation Gas Supply.**—At the last monthly meeting of the Newbury Town Council, the report, balance-sheet, and working statement of the gas undertaking for the year ending March 31 last, were presented. The gross profit—£2350—was the largest realized. The gas unaccounted for was 397,000 cubic feet less than in the preceding year. The balance-sheet showed that considerable improvement has been effected. The Committee recommended that £2500 be borrowed, as suggested by Messrs. Alfred Lass, Wood, and Drew, the Auditors, to defray the expenses for services, meters, and stoves, and to meet similar expenditure in the immediate future. Alderman Smith moved the adoption of the report. In doing so, he said there had been an increase in the output of gas of some 3 million cubic feet, and 376 tons more of coal had been carbonized. Slot-meters for the smaller houses had been introduced, and had proved a success, adding upwards of 1¼ million cubic feet to the consumption. There had been a most satisfactory increase in the profits, arising from the fact that they had been blessed by a very extraordinary year. The price of residuals had gone up on every hand, and this had resulted in an advance of £500 profit on that score; while the Committee had been fortunate in securing a very low contract for their coal, which was not likely to be effected again. This state of things was due to the energy of the Committee and the excellent management of Mr. Davey, under whose care the cost of producing gas had been reduced from 2s. 9d. to 2s. 2d. per 1000 cubic feet. Out of the profits it was proposed to set aside £600, which, with a sum of about £300 of unallotted profits from last year, would leave them with £1000 in hand. He did not think the price of coal would go up so high as was expected. However, if it was advanced even 2s. or 3s. per ton, he firmly believed the Committee would still be able to present a satisfactory account. The report was adopted.

**Bradford Gas Discounts and Accounts.**—The Gas Committee of the Bradford City Council have resolved that the system of gas discounts at present in force in the city should be continued, but that the accounts of owners and occupiers of each separate property should be kept distinct, and that the grouping of gas accounts should be discontinued.

**Portsmouth Water-Works Company.**—The report of the Directors of this Company for the half year ending the 31st of March shows that the available balance on the profit and loss account is £25,219, out of which they recommend the payment of the full statutory dividends. This, after deductions for void houses, &c., will leave a balance of about £9621 to be carried forward. During the past half year, 2399 yards of additional street service-mains were laid in new roads; making a total of about 46 miles of trunk and 127 miles of service mains. The additional services connected with the mains during the half year were 439; making the total number of premises now under constant supply by the Company 39,756. The quantity of water pumped from Havant and Bedhampton in the six months was 1,294,566,000 gallons, or an average daily supply for all purposes of 7,113,000 gallons; being an increase of 758,000 gallons daily as compared with the corresponding period of 1898-9. The quantity supplied for domestic use was equal to an average of 29¾ gallons per day per head of the population, exclusive of all supplies by meter. The number of fire hydrants now fixed in the Company's districts is 3112. The Engineers (Messrs. Joseph Quick and Son) report that the engines, boilers, reservoirs, and works are in good order. The report was adopted at the meeting of the Company last Thursday.

**The Salary of the Plymouth Water Engineer.**—At a meeting held a short time since, the Plymouth Town Council had under consideration the question of the salary to be paid to the new Water Engineer. Mr. Sandeman, who, as already mentioned, vacates the position, received a commencing salary of £250, which was eventually increased to £400. The Water Committee recommended that his successor should be paid £300, and that £50 a year should be added until a maximum of £500 is reached. He is also to be allowed to have two pupils. Alderman Bond said this was the unanimous recommendation of the Committee, who realized that the Water Engineer would have control of a property of the value of more than half-a-million of money. Mr. R. J. Bazley thought the salary proposed was too alarming. If they agreed to pay the same sum as when Mr. Sandeman was appointed, it would be very liberal, as they had no new works in view. He proposed, as an amendment, that the salary should commence at £200, and that the maximum should be £300. The pupils would probably bring in £100 a year. The Mayor (Alderman Pethick) said this was only the wages of a mechanic. They could not offer an engineer £200 a year. Alderman Bond remarked that events had shown that Mr. Sandeman had never been paid for his services. They had been having the use of his brains, and they would want the brains of another man. After further discussion, the recommendation of the Committee that the salary should commence at £300 and rise to a maximum of £500 was adopted, but with the provision that the annual increment shall be £25 a year, instead of £50, as proposed by the Committee.

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**Water Charges to Bradford Manufacturers.**—A deputation from the Bradford Dyers' Association, the Yorkshire Woolcombers' Association, and the Slubbing Dyers' Association waited last Wednesday on the Water Committee of the Bradford City Council in regard to the proposed increase in water charges. It was pointed out by Mr. Thomas Speight, one of the Directors of the Woolcombers' Association, that any proposed increase in the charges would seriously affect the finances of the Water Committee. Many large consumers would sink wells and take means to soften water, and would economize in other ways. It will be remembered that it was proposed to raise the price from 6½d. to 8d. per 1000 gallons for all water used over 400,000 gallons; but when the matter came before the City Council it was referred back. After last Wednesday's conference, a Sub-Committee decided to recommend the Council to raise the price from 6½d. to 7½d. per 1000 gallons for all water consumed over 400,000 gallons.

**Formation of a Reservoir Rating Association.**—The first meeting of the Committee appointed at the conference of Local Authorities recently held for the purpose of bringing about a change in the law relating to the assessment of reservoirs (*ante*, p. 1140) took place last Wednesday at the Cannon Street Hotel. Mr. T. Croysdale (Sunbury) having been unanimously elected Chairman of the Committee, he said their first business would be to give the Committee a title. Several names were suggested, and "The Association for Promoting the Equitable Rating of Reservoirs" was fixed upon. Mr. Scott (Sunbury) was unanimously appointed Hon. Secretary of the Association. A resolution was then passed asking each delegate to obtain the authority of his Council to contribute a sum, not exceeding £20, towards the expenses. Mr. Scott suggested that the constitution of the Association, showing what the objects were, should be drafted; and it was left to the Clerk (Mr. Goddard) to prepare this, and present it to the next meeting.

Messrs. R. Dempster and Sons, Limited, of Elland, have secured the contract from the Desborough Gas Company for remodelling their works. It consists of extensions to the carbonizing plant previously erected by the firm, condensers, exhauster, coal-store roof, &c.

Messrs. W. C. Holmes and Co., of Huddersfield, have received orders for their patent "New" scrubber-washer from the Coatbridge Gas Company, the Johnstone Gas Commissioners, the Hastings and St. Leonards Gas Company, and the Carlton Iron Company, Limited (third order).

Messrs. J. Taylor and Co., of Bolton, have in hand solid plate lead saturators of their latest make for the Durham Coke and Bye-Products Company, Limited, for their Malton Works, the Heywood Corporation Gas Department, the Abingdon Gas Company, the Blackburn Corporation, and the Kendal Corporation Gas Department. We are informed that the Blackburn and Kendal saturators were specially notified in the specifications, by the Gas Engineers to those Corporations, when asking for tenders from gas-plant makers for the erection of complete sulphate of ammonia plant.

We have received from the Loomis-Pettibone Company, of New York, who have taken over the business formerly carried on under the name of Mr. Burdett Loomis, of Hartford (Conn.), a pamphlet setting forth the value of gaseous fuel, and giving particulars of the Loomis plant for making producer and water gas. The Company make a speciality of the installation of this plant and gas engineering generally; but they also act as consulting or constructing engineers. We are informed that the Company have secured a number of large contracts for gas plants to be used chiefly for manufacturing purposes, and are at present engaged upon installations for the production of gas for use in engines. It is stated that with those already at work one brake horse-power per hour is obtained with the gas produced from 1 lb. to 1¼ lbs. of bituminous coal. The Company are at present erecting large plants for the production of gas to be employed for forging, welding, heating rivets, &c., and driving gas-engines.

The third ordinary general meeting of Meters, Limited, was held in Manchester last Tuesday—Alderman Miles in the chair. The Directors' report showed a gross profit of £30,676, and a net profit of £18,701, out of which it was proposed to pay a dividend at the rate of 5½ per cent. on the preference shares and 5 per cent. on the ordinary shares, to write off the remainder of the preliminary expenses (£1966), transfer £2000 from the forfeited share account and £2000 from the profit and loss account to the reserve, and carry the balance of £526 to the next year's accounts. The Chairman, in moving the adoption of the report, said he regarded it as very satisfactory, particularly when the shareholders took into consideration the difficulties they had had to face during the past year. All the materials used in their manufacture—copper, tin, and iron—had been largely enhanced in value; while, on the other hand, they had only been able to make a slight advance in the price of the goods they manufactured as from the 1st of October last, and this had been so small as to be scarcely appreciable. Their orders were larger than they were last year, and their turnover was more; and if they could only continue in this state, he thought they had every reason to expect success. Mr. F. H. Orme seconded the motion, which, after some discussion, was carried unanimously.

## WHITSUN HOLIDAY.

**NOTICE TO ADVERTISERS.—In consequence of the WHITSUN HOLIDAY, orders with respect to ADVERTISEMENTS should be received at the Office *not later* than THE FIRST POST ON SATURDAY NEXT.**


GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.

JOHN WM. O'NEILL, Managing Director,
160, 161, & 162, PALMERSTON BUILDINGS,
OLD BROAD STREET,
LONDON, E.C.

ANDREW STEPHENSON, AGENT. All communications *re* Oxide to the Company as above.

WINKELMANN'S

"VOLCANIC" FIRE CEMENT.

Resists 4500° Fahr. Best for use in GAS-WORKS.

ANDREW STEPHENSON,
182, Palmerston Buildings,
Old Broad Street,
"Volcanism, London." London, E.C.

BROTHERTON & CO.

Offices: Commercial Buildings, LEEDS. Correspondence invited.

HYDRATED OXIDE OF IRON.

PREPARED from Pure Iron.

Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.

READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

AMMONIACAL LIQUOR wanted.

BROTHERTON AND CO., Ammonia Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

TO GAS AND WATER OFFICIALS.

HIGH-CLASS Cycles at reasonable and low Prices. Guaranteed for Twelve Months. Sent on approval. For Cash or Gradual Payment System. Send for Catalogue, Post Free.

MELROSE CYCLE COMPANY, COVENTRY.

BENZOL, specially made for the Enrichment of Gas.

ELLISON AND MITCHELL, LIMITED, Kilnhurst, near ROTHERHAM.

PRACTICAL RETORT SETTERS.

GEORGE NUTTALL & CO., 32, Havelock Road, Saltley, Birmingham.

Regenerator or other Furnaces erected to Engineers' own Designs. Best Work Guaranteed. Please write for Estimates.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM; and 45 & 47, Westminster Bridge Road, LONDON, S.E.

First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.

Telegraphic Addresses:
"Braddock, Oldham." "Metrique, London."

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Limited,

Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

GAS TAR wanted.

BROTHERTON AND CO., Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

ENRICH your Gas with cheap Benzol.

Specially prepared, free from sulphur. At to-day's Price of Benzol, ILLUMINATING POWER costs less than ONE-THIRD OF A PENNY PER CANDLE.

Apply to SADLER AND CO., MIDDLESBROUGH.

SULPHURIC ACID for Sale.

BROTHERTON AND CO., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

NEW GAS PLANT CEMENT.

JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.

For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

PORTER & CO., Gowts Bridge Works,

LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.

Telegraphic Address: "PORTER, LINCOLN."
[For Illustrated Advertisement, See May 8, p. 1178.]

CANNEL, COAL, ETC.

JOHN ROMANS & SON, EDINBURGH,

Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.

Prices, &c., will be forwarded on application
No. 80, ST. ANDREW SQUARE, EDINBURGH,
NEWTON GRANGE, NEWBATTLE, DALKEITH, } SCOTLAND.

GAS PURIFICATION.

OXIDE OF IRON BOG ORE.

BALE & CO.'S Oxide of uniform quality.

SPECIAL FIRE CEMENT, OXIDE PAINTS, OILS, SULPHURIC ACID, &c.

120 and 121, NEWGATE STREET, LONDON, E.C.
Telegrams: "BOGORE, LONDON."

SADLER & CO., Ltd., Middlesbrough,

Tar Distillers and Tar Colour Manufacturers. BENZOL specially prepared for Gas Enrichment free from Sulphur. Pure Hydrated OXIDE OF IRON for Purifying Gas either for Sale or Lent on Hire. Always Buyers of GAS TAR and AMMONIACAL LIQUOR.

SULPHATE OF AMMONIA SATURATORS.

JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c., CENTRAL PLUMBING WORKS, TOWN HALL SQUARE, BOLTON. Special attention to Repairs.

Before placing Orders, please write for Estimate.
Telegraphic Address: "SATURATORS, BOLTON."

PATENTS FOR INVENTIONS.

Messrs. J. C. CHAPMAN & CO., Chartered Patent Agents, ADVISE ON ALL MATTERS CONNECTED WITH ABOVE.

Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

DRAUGHTSMAN, experienced in the Design and Construction of all kinds of Gas Plant and Buildings, is open to Engagement.

Address G. W., care of STREET'S AGENCY, 30, CORNHILL, E.C.

ADVERTISER (Age 26) requires Situation as FITTER. Four Years in present Situation in Yorkshire. Good Reference.

Address No. 3501, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Situation as Working MANAGER or FOREMAN in Gas-Works. Good Carbonizer. Erect and Repair Plant; Main and Service Layer. Practical Gas-Fitter. Good Testimonials. Abstainer. Age 49.

G. WATSON, 45, Freeth Street, Oldbury, near BIRMINGHAM.

DRAUGHTSMEN, Two wanted, accustomed to Structural Ironwork and General Engineering.

Apply to W. J. JENKINS AND CO., LIMITED, RETFORD.

WANTED, Three General Gas-Fitters, having experience in fixing Cooking and other Stoves.

Apply to the ENGINEER, Gas-Works, COVENTRY.

**EXPERIENCED** General Engineer's DRAUGHTSMAN wanted.

Apply, stating Age, Experience, and Salary required to WEST'S GAS IMPROVEMENT COMPANY, LIMITED, Albion Iron-Works, Miles Pla ting, MANCHESTER.

**WANTED,** at once, a good Stoker. Must be a good Shovel Charger, and be able to look after Engine and Exhauster. Wages 28s. per week. Seven Days or Nights.

Application, with References, to the MANAGER, Gas-Works, BEXHILL.

GAS-METER TRADE.

**WANTED,** Experienced Representative, having good connection, to represent METER FIRM in the Provinces.

Apply, giving all Particulars, to JOHN WRIGHT AND Co., LIMITED, Essex Works, BIRMINGHAM.

**WANTED,** a level-headed and practical Man to LAY OUT new Foundry and SUPERINTEND and take charge of CASTINGS for Gas Cooking-Stoves on up-to-date and economical System. Good and permanent position for suitable person.

Apply, by letter, to No. 3492, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

**APPLICATIONS** are invited for the post of MANAGER of the HEATING and COOKING DEPARTMENT of a Gas Company situate abroad, which will shortly be vacant.

Applications, giving Capabilities, and Details of past Experience, should be addressed to No. 3504, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

**WANTED,** a competent and experienced Retort-House FOREMAN, for a Provincial Works, making 350 million cubic feet of Gas yearly. Must be accustomed to Regenerative Firing and Machine Stoking.

Apply, by letter, stating Wages required, and enclosing *copies* of References, to No. 3503, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

**WANTED,** immediately, Two or Three steady STOKERS, for Shovel Charging. Permanency to reliable Men. Good Wages given.

Apply, stating Age, Married or Single, and how soon able to commence Duties, to

J. H. TROUGHTON.

Gas-Works, Newmarket,
May 26, 1900.

**WANTED,** a Steady, Reliable Stoker, for Small Gas-Works, accustomed to Shovel Charging and attending to Engine and Exhauster, and to make himself generally useful. Would be required to do from Two to Three Months' Night Work in Summer. Wages 28s. for Seven Months and 26s. for Five Months. None but steady Men need apply.

Apply, by letter, with Testimonials, to No. 3500, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

HORSHAM GAS COMPANY, LIMITED.

**WANTED,** by the above Company, a competent Man as CLERK, COLLECTOR, and METER INSPECTOR. One well acquainted with the general routine of a Gas Office, and capable of preparing Balance-Sheets.

Applications, stating Age, Experience, present Employment, and Salary required, accompanied by *copies* of not more than three recent Testimonials, endorsed "Clerk, &c.," to be sent to the Chairman of the Company, Gas Office, Horsham, on or before the 6th of June, 1900.

(Signed) W. E. BARNEY,
Secretary.

May 24, 1900.

**SMALL** Purifier (second-hand) Wanted, Cheap.

Send Size and Price to JAMES ROGERS, Maldon, ESSEX.

**WANTED,** a cheap, Second-Hand GASHOLDER of 6000 to 8000 cubic feet capacity, with Cast Iron or Steel Tank. To be erected a short distance from a Seaport in South East of Ireland.

Offers, by letter, to No. 3502, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

HYDE GAS COMPANY.

**FOR SALE**—A Vertical Exhauster and ENGINE, with Two Plunge Pumps, 12-inch Valves and Connections, made by George Anderson. Can be seen working.

For further Information, apply to CHARLES POTTS, Secretary and Manager, Gas-Works, Raglan Street, Hyde, near MANCHESTER.

**CONDENSERS,** Washer-Scrubbers, "Cutler" patent CONDENSERS (14) 6 in. to 12 in. PIPE CONDENSERS, Patent WASHERS by "Livesey," "Holmes," and "Cockey," EXHAUSTERS up to 60,000 Cubic Feet per hour. ENGINES, BOILERS, &c. Several TOWER SCRUBBERS, PURIFIERS, METERS, GOVERNORS, PUMPS, TANKS, VALVES, &c.

J. FIRTH BLAKELEY AND Co., Gas Engineers, DEWSBURY.

EXHAUSTER.

**OWING** to Extensions, the Altrincham Gas Company have FOR DISPOSAL a 30,000 Cubic Feet per hour EXHAUSTER (Beale's Patent, by Bryan Donkin and Co.). The Exhauster is in good serviceable condition, and can be seen working.

For further Particulars, apply to the undersigned.

J. E. LAMB,
Manager.

Gas-Works, Altrincham,
May 24, 1900.

**ENGINES** and Exhausters combined "Waller," to pass 30,000 cubic feet per hour. DITTO to pass 7000 feet per hour, overhauled and complete. Cheap to clear. Also BOILERS.

J. FIRTH BLAKELEY AND Co., Thornhill, DEWSBURY.

**FOR SALE**—Two Lancashire Boilers, each 6 ft. diameter by 20 ft. long, with Mountings. Been in use only a short time. Made by the Yorkshire Engine Company, Limited, Sheffield.

Apply to NEWTON, CHAMBERS, & Co., LIMITED, Thorncliffe Iron-Works, near SHEFFIELD, where the Boilers may be seen.

**GAS PLANT** for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.

J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

TAR AND AMMONIACAL LIQUOR.

**THE** Directors of the Oakengates Gas Company invite TENDERS for the purchase of the surplus TAR and AMMONIACAL LIQUOR, produced at their Works during Twelve Months, ending June 30, 1901.

Tenders, endorsed, and sent to the undersigned, on or before June 14.

E. PARKER,
Manager.

Gas Offices, Oakengates,
May 26, 1900.

LURGAN GASLIGHT AND CHEMICAL COMPANY, LIMITED.

COAL WANTED.

**THE** Directors invite Tenders for the supply of 3900 Tons of best quality screened GAS COAL, and 100 Tons of STEAM COAL, delivered into the Works at Lurgan, or placed on Lighters, or on Rail, at Belfast.

Eight Hundred Tons of the required quantity should be Scotch Coal, suitable for use in Hislop's Patent Regenerative Furnaces.

The Coal must be delivered in such quantities and at such times as the Directors may fix; but a large proportion can be taken before the 1st of November.

Each Cargo to be accompanied by a Certificate as to place of origin.

Tenders (in sealed envelope), accompanied by reference to Gas-Works using the Coal offered, should reach me not later than Saturday, the 2nd of June, 1900.

The Directors do not bind themselves to accept the lowest or any Tender.

FRED. W. MAGAHAN,
Secretary.

Gas-Works, Lurgan,
May 7, 1900.

URBAN DISTRICT COUNCIL OF OLDBURY.
(GAS DEPARTMENT.)

**THE** Gas Committee of the Urban District Council of Oldbury are prepared to receive TENDERS for the supply of 10,500 Tons, or thereabouts, of screened GAS COAL for delivery during the Year ending the 31st of August, 1901, in such quantities and at such times as ordered, carriage free, at the (1) Oldbury Basin, G.W. Railway, and (2) L. & N.W. Railway, Oldbury.

The Coal must be of first-class Quality, well screened, freshly wrought, and perfectly free from Bats, Pyrites, and other Foreign Matter.

Sealed Tenders, addressed to the Chairman of the Gas Committee, and endorsed "Tender for Gas Coal," must be delivered to the undersigned, not later than Saturday, June 16 next.

The Gas Committee do not bind themselves to accept the lowest or any Tender, and reserve to themselves the right to apportion the whole quantity as they may think fit.

Tender Forms, and any further Information, may be obtained from the undersigned on application in writing.

By order,
A. COOKE,
General Manager.

Gas-Works, Oldbury,
May 25, 1900.

URBAN DISTRICT COUNCIL OF OLDBURY.
(GAS DEPARTMENT.)

**THE** Gas Committee of the Urban District Council of Oldbury are prepared to receive TENDERS for the supply of 150 Tons of OIL, suitable for the Manufacture of Carburetted Water Gas.

The Oil to have a Flashing-Point of not less than 73° (Abel's Test), and not less than any higher degree of Temperature which may be specified in any future Act of Parliament, or Regulations to be made thereunder.

The Oil to be delivered, free of all charges, into the Storage Tank of the Council at the Gas-Works, in such quantities and at such times as required, during a period of One Year from the 31st of July, 1900.

Tenders to be at a price per Imperial Gallon.

Analysis of the Oil, with full Description, must be sent in with each Tender along with a sealed sample of the Oil offered.

Sealed Tenders, addressed to the Chairman of the Gas Committee, and endorsed "Tender for Gas Oil," must be delivered to the undersigned not later than Saturday, June 16 next.

The Gas Committee do not bind themselves to accept the lowest or any Tender, and reserve to themselves the right to apportion the whole quantity as they may think fit.

By order,
A. COOKE,
General Manager.

Gas-Works, Oldbury,
May 25, 1900.

TENDERS FOR TAR.

**THE** Directors of the Croydon Commercial Gas and Coke Company invite TENDERS for the purchase of their surplus TAR for One Year, commencing on the 1st of July next.

Specifications for the Contract will be forwarded on application. Rail communication direct to the Works.

Tenders, endorsed "Tender for Tar," must be delivered not later than Thursday, the 7th of June, to

WILLIAM J. RUSSELL,
Secretary.

Katharine Street, Croydon,
May 25, 1900.

TENDERS FOR GAS COAL.

**THE** District Council Gas Committee of Padiham invite TENDERS for the supply of GAS COAL.

Specification and Form of Tender may be obtained on application to the undersigned, or at the Gas Offices.

Tenders to be sent in not later than Saturday, June 9, 1900, addressed to the Chairman, and endorsed "Tender for Gas Coal."

J. R. SMITH,
Clerk.

District Council Offices, Padiham,
May 22, 1900.

CHIPPING NORTON GAS COMPANY.

TENDERS FOR GAS COAL.

**THE** Gas Committee of the above Company invite TENDERS for the supply of from 500 Tons to 1100 Tons of best screened GAS COALS, to be delivered f.o.r. at the Gas-Works Siding, in such quantities and at such times as the Manager may direct, for a period of Six or Twelve Months, from July 1 next.

Sealed and endorsed Tenders to the SECRETARY, Gas Company, CHIPPING NORTON.

BOROUGH OF RAMSGATE.
(GAS DEPARTMENT.)

**THE** Gas and Water Committee desire TENDERS for the construction of a RETORT-HOUSE; also IRON ROOF, JOISTS, &c.

Specifications and Quantities may be obtained from William A. M'Intosh Valon, Gas Offices, Ramsgate, on payment of £5 5s., which will be returned on receipt of a *bonâ-fide* Tender, together with Specifications and Quantities fully priced out.

Tenders must be sent in, addressed to the Chairman of the Gas and Water Committee, Boundary Road, Ramsgate, not later than Ten a.m. on Monday, June 11, 1900.

The Committee do not bind themselves to accept the lowest or any Tender.

W. A. HUBBARD,
Town Clerk.

TENDERS FOR COAL.

**THE** Directors of the Derby Gaslight and Coke Company are prepared to receive TENDERS for the supply of 40,000 Tons of screened SOFT COAL and SOFT COBBLES or NUTS, to be divided in One, Two, or more Contracts, as the Board may decide; but they do not bind themselves to accept the lowest or other Tender or Tenders.

Forms of Tender may be obtained from the undersigned.

Sealed Tenders, endorsed "Tender for Coal," and addressed to the Chairman of the Finance Committee, must be delivered at the Offices of the Company, Friar Gate, on or before Thursday, June 7.

By order of the Directors,
RICHARD FISHER,
Secretary.

Gas Office, Derby,
May, 1900.

PAIGNTON GAS COMPANY.

TENDERS FOR GAS COAL.

**THE** Directors of the Paignton Gas Company are prepared to receive TENDERS for the supply of about 2000 Tons (or such other quantity as may be agreed on) of best approved GAS COALS, in such monthly quantities as may be required by the Company.

Tenders to state the Price of the Coal, delivered at Paignton Station, Great Western Railway, free of all charges.

The Directors do not bind themselves to accept the lowest or any Tender.

Further Particulars may be obtained on application to Mr. C. G. Dawson, the Company's Manager.

Sealed Tenders, endorsed "Tender for Coal," specifying the description and quality of Coal, to be sent on or before the 9th of June addressed to the undersigned, Gas Offices, 5, Victoria Street, Paignton.

F. W. PUDDICOMBE,
Secretary.

Paignton, May 19, 1900.

CITY OF HEREFORD.

**THE** Gas Management Committee of the Corporation invite TENDERS for the supply of best screened large GAS COAL for One Year, from the 1st of August next, to be delivered free at the Gas-Works Siding, Hereford, in such quantities as may be required from time to time.

The estimated Quantity required will be about 9500 Tons.

Full Particulars and printed Forms of Tender may be obtained on application to the undersigned.

Tenders, endorsed "Tender for Gas Coal," are to be sent in addressed to the Chairman, Gas Management, Committee, Mansion House, Hereford, by Saturday, June 9.

The Committee do not bind themselves to accept the lowest or any Tender.

By order,
WILLIAM PARLBY,
Gas Engineer and Manager.

Gas-Works, Hereford,
May 23, 1900.

### BOROUGH OF MACCLESFIELD.

**THE Gas Committee are prepared to receive** TENDERS for the supply of the whole or part of 9000 Tons of the Best Screened GAS COALS and 1000 Tons of CANNEL, to be delivered free at Macclesfield in such quantities as may be required, and to weigh 20 cwt. to the ton over the Committee's Weighing-Machine at their Works.

Forms of Tender and Conditions may be had on application to the Engineer, Gas-Works, Macclesfield.

Tenders, sealed and endorsed, to be sent in not later than Saturday, the 9th day of June, 1900, addressed to the Chairman, Gas Committee, Town Hall, Macclesfield.

The Committee do not pledge themselves to accept the lowest or any Tender.

W. FREDK. TAYLOR,
Town Clerk.

May 9, 1900.

### BUXTON URBAN DISTRICT COUNCIL.

TENDERS FOR TAR AND LIQUOR.

**THE Gas Committee invite Tenders for** the purchase of the surplus TAR and LIQUOR produced at their Works in Ashwood Dale, for One Year commencing from the 30th of June next.

Further Particulars and Forms of Tender may be obtained of Mr. H. Barker, Engineer, Town Hall, Buxton.

Tenders, endorsed "Tender for Tar and Liquor," to be addressed to the Chairman of the Gas Committee, and delivered not later than noon on the 2nd day of June.

The Council do not bind themselves to accept the highest or any Tender.

By order,
JOSIAH TAYLOR,
Clerk.

### BUXTON URBAN DISTRICT COUNCIL.

TENDERS FOR COAL AND CANNEL.

**THE Gas Committee invite Tenders for** the supply of 6000 Tons of best screened GAS COAL and 4000 Tons of CANNEL, to be delivered at their Siding (on the Midland Railway) in Ashwood Dale, Buxton, at such times and in such quantities as may be required during the Year from the 1st of July, 1900, to the 30th of June, 1901.

Tenders, endorsed "Tender for Coal and Cannel," addressed to the Chairman of the Gas Committee, to be delivered at the Town Hall, Buxton, not later than noon on the 2nd day of June.

Forms of Tender and other Particulars may be obtained of Mr. H. Barker, Engineer, Town Hall, Buxton.

The Council do not bind themselves to accept the lowest or any Tender.

By order,
JOSIAH TAYLOR,
Clerk.

### LINCOLN CORPORATION
(GAS DEPARTMENT.)

TENDERS FOR COAL.

**THE Gas Committee of the Lincoln Corporation** invite TENDERS for the supply of 26,000 Tons of screened GAS COALS and NUTS, to be delivered during a period commencing the 1st of July, 1900, and terminating the 30th of June, 1901.

Further Particulars and Forms of Tender may be obtained from the undersigned.

Sealed and endorsed Tenders, addressed to the Chairman of the Gas Committee, must be delivered on or before the 16th of June next.

The Committee do not bind themselves to accept the lowest or any Tender.

JNO. CARTER,
Manager.

Gas Offices, Lincoln,
May 24, 1900.

### LINCOLN CORPORATION.
(GAS DEPARTMENT.)

TENDERS FOR TAR.

**THE Gas Committee of the Corporation** of Lincoln are prepared to receive TENDERS for the purchase of the surplus TAR (about 1200 Tons) produced at their Works during the period of One Year commencing on the 1st of July, 1900.

Sealed Tenders, addressed to the Chairman of the Gas Committee, and endorsed "Tender for Residuals," must be delivered at the Gas Offices, Lincoln, on or before the 16th of June next.

The Committee do not bind themselves to accept the highest or any Tender.

Other Particulars may be obtained of the undersigned.

JNO. CARTER,
Manager.

Gas Offices, Lincoln,
May 24, 1900.

### TENDERS FOR GAS COAL.

**THE Directors of the Bath Gaslight and** Coke Company invite TENDERS for the supply of about 36,000 Tons of GAS COAL, screened or unscreened, upon Contracts of 3000 Tons, or multiples of that quantity, during the Year commencing the 1st of July next.

The Directors undertake to purchase from each party whose Tender is accepted a total quantity of at least 3000 Tons, but do not bind themselves to accept the lowest or any Tender.

Full Particulars and Form of Tender may be obtained on application to Mr. C. S. Ellery, the Company's Engineer.

Tenders, endorsed "Tender for Gas Coal," to be sent in, addressed to the undersigned, not later than Twelve o'clock (noon) on Tuesday, the 5th day of June next.

GEORGE HELPS,
Secretary.

Gas Company's Offices, Bath,
May 23, 1900.

THE INCORPORATED

# Gas Institute.

THE THIRTY-SEVENTH

## ANNUAL GENERAL MEETING

**OF THE MEMBERS**

WILL BE HELD ON

**TUESDAY (10.30 a.m.) and WEDNESDAY (10 a.m.),**

the 12th and 13th of June, 1900,

AT THE

## ROYAL UNITED SERVICE INSTITUTION,

**WHITEHALL, LONDON.**

THE CHAIR WILL BE TAKEN BY THE PRESIDENT,

**E. HERBERT STEVENSON, Esq., M.Inst.C.E.**

In connection with the Meeting an EXCURSION TO PARIS has been arranged, starting on Wednesday evening, June 13. Full Particulars are announced in the Programme.

### THE BENEVOLENT FUND.

The Annual General Meeting of the Donors and Subscribers to the Benevolent Fund will be held on Tuesday, June 12, at the close of the sitting, about One p.m.

WALTER T. DUNN, Secretary.

13, *Victoria Street, Westminster, S.W.*

### BRIERLEY HILL DISTRICT GASLIGHT COMPANY.

TENDERS FOR TAR.

**THE Directors invite Offers for the surplus** TAR made at their Brierley Hill and Kingswinford Works, to be taken between July 1 next and June 30, 1901, delivered into Buyers' Boats.

The Directors do not bind themselves to accept the highest or any Tender.

Tenders, to be addressed to the Chairman, endorsed "Tender for Surplus Tar," not later than June 22 next.

HENRY M. JACKSON,
Secretary.

Board-Room, Gas-Works,
Brierley Hill, May 14, 1900.

### TENDERS FOR GAS COAL.

**THE Magistracy of Copenhagen are** prepared to receive TENDERS for the supply and delivery of 60,000 Tons of best GAS COAL from August, 1900, until the end of January, 1901. The Magistracy reserve the right to divide the Contracts between two or more Contractors.

Further Information and Conditions for the delivery may be obtained on application to Københavns Belysmugsvæsen, Vestre Boulevard, København, W.

The Tenders, sealed and marked "Tilbud paa Kul," to be sent to Magistratens 4' Afdelnig, Lavendels trade 1. København, K., before the 25th of June, 1900, at Twelve o'clock, at which time the Tenders will be opened in the presence of the parties tendering, who are in attendance.

THE MAGISTRACY OF COPENHAGEN.

May 26, 1900.

### TENDERS FOR TAR.

**THE Directors of the Clayton, Allerton,** and Thornton Gas Company are prepared to receive TENDERS for the purchase of the COAL TAR produced at these Works during a period of Twelve Months from the 1st day of July, 1900, to the 30th of June, 1901.

Quantity, about 400 Tons.

The Tar will have to be removed daily from the 1st of October to the end of April.

Sealed Tenders, endorsed "Tender for Tar," addressed to the Chairman at the Gas-Works, to be delivered at or before Noon, on Monday, the 11th of June, 1900.

The Directors do not pledge themselves to accept the highest or any Tender.

By order,
JOHN NIVEN,
Secretary and Manager.

Gas-Works, Clayton, near
Bradford, May 8, 1900.

### TENDERS FOR GAS COAL.

**THE Directors of the Clayton, Allerton,** and Thornton Gas Company invite TENDERS for the supply of 8000 Tons of GAS COAL, screened and unscreened, and 1000 Tons of CANNEL COAL. The Coal to be free from Scale, Sulphurous Pyrites, or other objectionable matter, and to be delivered at the Gas-Works, Low Lane, Clayton, or at the Great Northern Railway Station, Clayton, in such quantities weekly as may be ordered by the Company's Manager, during the next Twelve Months. The said Tenders to state the Seam and the Pit from which the Coal is intended to be sent.

Sealed Tenders, endorsed "Tender for Gas Coal," addressed to the Chairman at the Gas-Works, to be delivered at or before Noon on Monday, the 11th day of June, 1900.

The Directors do not pledge themselves to accept the lowest or any Tender, reserving to themselves the right to divide the contracts as they may think proper.

By order,
JOHN NIVEN,
Secretary and Manager.

Gas Offices, Clayton, near
Bradford, May 8, 1900.

### LEAMINGTON PRIORS GAS COMPANY.

TENDERS FOR GAS COAL.

**THE Directors of the Leamington Priors** Gas Company are prepared to receive TENDERS for the supply of the GAS COAL required by them during Twelve Months from the 1st of July next.

Particulars and Forms of Quotation may be obtained from the undersigned.

Tenders must be sent in on or before Thursday, the 7th of June, 1900.

THOMAS BERRIDGE,
Engineer and Secretary.

### KING'S LYNN GAS COMPANY.

**THE Directors of the King's Lynn Gas** Company invite TENDERS for the supply of about 7000 Tons of GAS COAL or NUTS, for delivery from July 1, 1900, to June 30, 1901.

Tenders, endorsed "Coal," stating Price f.o.b. the Company's Steamboats in Tyne or elsewhere, or f.o.r. Harbour Siding, King's Lynn, to be sent to the undersigned not later than June 2, 1900.

EDMUND G. SMITHARD,
Engineer.

Gas-Works, King's Lynn,
May 19, 1900.

### COUNTY BOROUGH OF WEST BROMWICH.
(GAS DEPARTMENT.)

TO COLLIERY PROPRIETORS.

**THE Gas Committee are prepared to** receive TENDERS for the supply of 32,000 Tons of GAS COAL, for use at their Works, Albion, West Bromwich.

The Committee do not bind themselves to accept the lowest or any Tender; and they reserve to themselves the right to divide the Contract between several Firms.

Forms of Tender may be obtained on application to Mr. Thomas Glover, Manager of the Works.

Sealed Tenders, properly endorsed, to be sent to me not later than Monday, the 11th of June.

By order,
THOS. HUDSON,
Secretary.

Town Hall, West Bromwich,
May 26, 1900.

### URBAN DISTRICT OF MILFORD HAVEN.

TENDERS FOR GAS COAL.

**THE Milford Haven Urban District** Council are prepared to receive TENDERS for about 700 Tons of large GAS COAL, and also about 100 Tons of BITUMINOUS STEAM COAL, to be delivered between the middle of June, 1900, and the 31st of March, 1901. The whole of the Coal to be Fresh Hewn, Clean, and free from Impurities.

Further Particulars and Forms of Tender can be obtained on application to the undersigned.

Sealed Tenders, endorsed "Tender for Coal," addressed to the Chairman, Gas and Water Committee, to be sent in not later than the 6th of June next.

The Council do not bind themselves to accept the lowest or any Tender.

By order,
THOMAS H. LEWIS,
Clerk.

Milford Haven,
May 25, 1900.

### SCARBOROUGH GAS COMPANY.

AMMONIACAL LIQUOR.

**THE Directors of the Scarborough Gas** Company invite TENDERS for the whole of the AMMONIACAL LIQUOR, to be produced at their Works for One or more Years from the 1st day of July next.

Tenders may be submitted either at a fixed Price per Ton or on a Sliding-Scale, regulated by the price of Sulphate. Preference will, however, be given to the latter.

Further Particulars may be obtained on application to the underigned.

Tenders (duly endorsed) must be delivered, addressed to the Chairman of the Company, not later than Noon, on Saturday, the 9th of June next.

The Directors do not bind themselves to accept the highest or any Tender.

By order,
J. HOLLIDAY,
Engineer and Secretary.

Gas Offices: 32, Westborough.
Scarborough, May 16, 1900.

### GLOUCESTER GASLIGHT COMPANY.

TENDERS FOR GAS COAL.

**THE Directors of the above Company** invite TENDERS for the supply of about 30,000 Tons of GAS COAL for One Year from the 1st day of July next, in such monthly quantities as may be required by the Company.

Tenders to state the price delivered at the Midland Railway Wharf, High Orchard, or the Great Western Railway Wharf, Llanthony, Gloucester; or if sent (as preferred) by Water, the price f.o.b., and also the price delivered at the Gas Company's Wharf on the Gloucester and Berkeley Canal.

Further Particulars and Forms of Tender may be obtained of the undersigned.

Sealed Tenders, endorsed "Tender for Coal," specifying the description and quality of the Coal, to be addressed to the Chairman, Gas Offices, Eastgate Street, Gloucester, and delivered not later than the 4th day of June next.

The Directors reserve to themselves the right to accept the whole or any portion of any quantity offered, and do not bind themselves to accept the lowest or any Tender.

By order,
WILLIAM E. VINSON,
Secretary.

Gas Offices, Gloucester,
May 3, 1900.

**THE Fareham Gas and Coke Company** invite TENDERS for 20 Tons of CAST-IRON PIPES and CONNECTIONS, delivered at Fareham Station or Company's Quay.

Particulars may be obtained from the Manager, J. Griffin.

Tenders to be delivered not later than Monday, June 4, 1900, addressed to,

HARRY SMITH,
Secretary.

Fareham, Hants.

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## BRISTOL GAS COMPANY.

TENDERS FOR GAS COAL AND CANNEL.

**THE Directors of the above Company** are prepared to receive TENDERS for the supply of their requirements (say 200,000 Tons) of GAS COALS during the Year ending the 30th of June, 1901.

Particulars and Forms of Tender may be obtained on application to the undersigned, to whom also Tenders, sealed and endorsed "Tender for Coal," must be delivered not later than Ten a.m. on Wednesday, the 13th day of June next.

JOHN PHILLIPS,
Secretary.

Chief Offices, Canons' Marsh, Bristol,
May 24, 1900.

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## ACCRINGTON DISTRICT GAS AND WATER BOARD.

**THIS Board invite Tenders for the** Surplus TAR and AMMONIACAL LIQUOR which may be produced at the Accrington and Great Harwood Works of the Board during the Year July 1 to June 30, 1901.

The estimated Quantity of Tar is 1700 Tons and Liquor 4500 Tons.

Sealed Tenders, endored "Tar and Liquor," addressed to the Chairman of the Board, must be in my hands on or before the 11th of June.

Forms of Tender may be obtained on application.

CHAS. HARRISON,
General Manager.

General Offices, Accrington,
May 15, 1900.

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## CONTRACT FOR GAS COAL.

**NOTICE is Hereby Given, that the Urban** District Council of Horncastle, in the County of Lincoln, are prepared to receive TENDERS for the supply of from 500 to 2000 Tons (Railway weight) of best screened SILKSTONE GAS COAL and GAS NUTS, to be delivered by the 30th of June, 1901, in such quantities and at such times as the Council may direct.

The Coal to be sent in a Dry Condition, free from Hards, Smudge, Dirt, Shale, Pyrites, or other Impurities.

Sealed Tenders, marked "Tender for Gas Coal," to be sent to the Clerk to the Council, on or before the 1st day of June, 1900.

The Council do not bind themselves to accept the lowest or any Tender.

By order,
S. GOE OVERTON,
Clerk to the Council.

2, Manor House Street, Horncastle,
May 26, 1900.

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## MALTA AND MEDITERRANEAN GAS COMPANY, LIMITED.

TO THE SHAREHOLDERS.

**NOTICE is Hereby Given, that the** ORDINARY GENERAL MEETING of the Shareholders of this Company will be held at the Offices, 60, Gracechurch Street, London, E.C., on Tuesday, the 12th of June, 1900, at Twelve o'clock Noon, for the purpose of receiving the Report of the Directors and the Accounts for the Year ended the 31st of March, 1900, and for the transaction of the General Business of the Company.

One of the Directors, Col. James Le Geyt Daniell, retires from office, and offers himself for re-election.

The Auditors, Mr. Robert Hesketh Jones and Mr. Thomas Guyatt, retire, and offer themselves for re-election.

The TRANSFER BOOKS WILL BE CLOSED from the 29th of May until the day of the Meeting, both days inclusive.

By order,
A. W. COOPER,
Secretary.

60, Gracechurch Street, E.C.,
May 15, 1900.

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## TAR AND AMMONIACAL LIQUOR.

**THE Directors of the Barnsley Gas Com-** pany invite TENDERS for the purchase of the surplus TAR and AMMONIACAL LIQUOR to be produced at their Works during a term of One Year commencing July 1 next.

Probable Quantities, and any other Particulars, on application to the undersigned.

Tenders, duly endorsed, addressed to the Chairman, to be delivered to me not later than Thursday, the 7th day of June prox.

The Directors do not bind themselves to accept the highest or any Tender.

By order,
W. W. HUTCHINSON,
Engineer and Manager.

Gas Offices, Barnsley,
May 28, 1900.

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## CHELSEA WATER-WORKS COMPANY.

**NOTICE is Hereby Given, that the** HALF-YEARLY GENERAL MEETING of the Governor and Company of Chelsea Water-Works, will be held at their Office, Commercial Road, Pimlico, in the County of London, on Thursday, the 21st day of June prox., at One o'clock in the Afternoon precisely, for the General Business of the Company.

The REGISTER OF TRANSFERS WILL BE CLOSED between the 9th day of June prox., and the 21st day of June prox., both days inclusive.

By order,
G. H. GILL,
Secretary.

Office: 41, Commercial Road, Pimlico,
May 26, 1900.

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## EAST LONDON WATER-WORKS COMPANY.

ISSUE OF £198,788 THREE PER CENT. DEBENTURE STOCK,

BEING THE BALANCE OF THE CAPITAL CREATED UNDER THE COMPANY'S STATUTORY POWERS.

**NOTICE is Hereby Given, that the** Directors are prepared to receive TENDERS for the above ISSUE, bearing Interest at 3 per cent. per annum, less Income-Tax, and redeemable at par after the expiration of 25 Years from the date of issue, subject to Six Months' Notice being given by the Company.

Tenders must be delivered at the Company's Offices, 15A, St. Helen's Place, Bishopsgate Street, E.C., not later than One o'clock p.m., on Monday, the 11th of June ensuing.

Particulars and Conditions, together with Form of Tender, may be obtained at the said Offices, or will be forwarded on application.

By Order of the Court of Directors,
I. A. CROOKENDEN,
Secretary.

15A, St. Helen's Place, Bishopsgate Street,
London, E.C., May 14, 1900.

---

## TUNBRIDGE WELLS GAS COMPANY.

SALE OF £5000 "D" STOCK
(NOW PAYING 8½ PER CENT. PER ANNUM.)
PURSUANT TO THE "TUNBRIDGE WELLS GAS ACT, 1887."

**MR. WM. ROPER will sell by Auction,** at The Pump Room, Tunbridge Wells, on Friday, June 8, 1900, at Four o'clock in the Afternoon precisely,

£5000
"D" STOCK
IN THE TUNBRIDGE WELLS GAS COMPANY,
In 10 Lots of £50 each, and 45 Lots of £100 each.

The Standard Rate of Dividend authorized to be paid in respect of this Stock is £7 per cent. per annum; but under the operation of the Sliding-Scale, Dividends to the extent of 8½ per cent. have been paid on this Stock since 1894.

Dividend on this Stock will commence to accrue as from the 1st day of August next.

The Tunbridge Wells Gas Company have for many Years paid the full amount of Dividends authorized by the Acts of Parliament; and the Auctioneer recommends the Stock now offered as a safe and particularly advantageous investment.

Further Particulars and Conditions of Sale may be had, and the Tunbridge Wells Gas Acts may be inspected, at the Offices of Messrs. STONE, SIMPSON, and STONE, Solicitors, Church Road; of the AUCTIONEER, Kentish Buildings, 6, London Road; and of the Secretary, Mr. JOHN READ, at the Offices of the Company, 44, High Street, TUNBRIDGE WELLS.

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## COUNTY BOROUGH OF OLDHAM.

**THE Gas-Works Committee invite** TENDERS for the TAR and AMMONIACAL LIQUOR, to be produced at their different Gas Stations for a period of One or more Years, commencing the 1st of July next.

The yearly make of Tar is about 8000 Tons, and of Ammoniacal Liquor about 2,500,000 Gallons.

Particulars and Forms of Tender can be obtained on application to Mr. Arthur Andrew, Gas and Water Offices, Oldham, to whom Tenders are to be sent on or before Tuesday, June 19, 1900.

A. NICHOLSON,
Town Clerk.

Oldham, May 24, 1900.

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## SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

**MR. ALFRED RICHARDS begs to** notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held PERIODICALLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by AUCTION of GAS and WATER STOCKS and SHARES under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

---

By order of the Directors of the

## SOUTHEND GAS COMPANY.

ISSUE OF £4500 FOUR PER CENT. PERPETUAL DEBENTURE STOCK, AND £750 NEW ORDINARY STOCK.

**MR. ALFRED RICHARDS will Sell** THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, June 12, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

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By order of the Directors of the

## WALTON-ON-THAMES AND WEYBRIDGE GAS COMPANY.

NEW ISSUE OF 170 £10 "B" SHARES.

**MR. ALFRED RICHARDS will Sell** THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, June 12, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

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By order of the Directors of the

## HERNE BAY GAS AND COKE COMPANY, LTD.

NEW ISSUE OF 1000 £5 ORDINARY SHARES.

**MR. ALFRED RICHARDS will Sell** THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, June 12, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

---

By order of the Directors of the

## CRAWLEY GAS COMPANY, LIMITED.

THE FREEHOLD GAS-WORKS SITUATE AT CRAWLEY, SUSSEX.

Conveniently placed close to the Main Road, within about half-a-mile of Crawley Station on the London, Brighton, and South-Coast Railway, and comprising Retort-House (with Nine Retorts), Two Gasholders, Purifiers, Scrubber, Coal-Store, Lime-Shed, Tar-Well, Meter and Governor House, Manager's House, together with the Mains to a length of about 3½ miles, Meters, Services, and Tools. The whole to be sold as a going concern, and with possession on completion.

**MR. ALFRED RICHARDS will Sell** THE ABOVE BY AUCTION, at the Mart, Tokenhouse Yard, E.C., on Tuesday, June 12, 1900, at Two o'clock.

Particulars of the SECRETARY of the Company, at the Offices, High Street, CRAWLEY; of Messrs. HOLMES, LEAR, AND BELDAM, Solicitors, ARUNDEL; and of Mr. ALFRED RICHARDS, Auctioneer, 18, FINSBURY CIRCUS, E.C.

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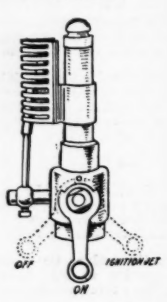
For Ordinary Burner.




Price 2/6 complete.

THE

# MACHEBACH GAS LIGHTERS

ECONOMY, SAFETY, SIMPLICITY.

NO MATCHES, TAPERS, &c., REQUIRED.

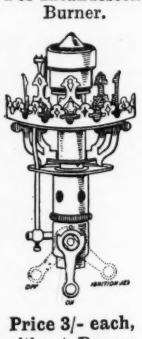
SAVES GAS.

FULL PARTICULARS OF PRICES AND OTHER FORMS OF SELF-LIGHTERS ON APPLICATION TO

The Matchless Gas Lighting Syndicate, Limited,

130, QUEEN VICTORIA STREET, LONDON, E.C.

For Incandescent Burner.



Price 3/- each, without Burner or Mantle.

*Shortly to be Published. Price 6s.*

**LAW**
OF
**LONDON GAS COMPANIES**

A Synopsis of Public Acts affecting Gas Companies and of the Special Acts of the Metropolitan Companies, with Comments and a Short History: Including a Statement of the effects of the Conversion Acts of the Gaslight and Coke Company, and of the South Metropolitan Company, and an Examination of the Capital and Loan Accounts to date of the three London Companies and of the Bills now before Parliament.

BY

T. J. BARNES,
of the Middle Temple, *Barrister-at-Law.*

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WALTER KING,
Office of the "Journal of Gas Lighting," &c.,
11, BOLT COURT, FLEET STREET, E.C.

**NEWBATTLE CANNEL.**
**Highest Results in Gas, & Excellent Coke.**
QUOTATIONS ON APPLICATION TO
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**HEATHCOTE GAS COAL.**
**Rich in Illuminating Power and Yield of Gas.**
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**Maintains a High Standard in Residuals.**
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**CHESTERFIELD.**

**LONDONDERRY GAS COALS**
FROM THE
**LONDONDERRY COLLIERIES,**
COUNTY OF DURHAM.
Available Output up to 5000 Tons per day.
Yield of Gas 11,000 cubic feet per Ton of Coal
as per Analysis by
Mr. John Pattinson, F.C.S., F.I.S.
For Prices and Particulars, apply to
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**SEAHAM HARBOUR,**
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**16, DEANSGATE, MANCHESTER.**
GAS ENGINEERS' AGENTS AND CONTRACTORS FOR
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**SULPHURIC ACID.**
GUARANTEED absolutely free from Arsenic and of excellent Purity. Specially prepared for Sulphate of Ammonia Manufacturers.
Works: BLACKBURN; Miles Platting and Clayton, MANCHESTER.
Head Office: Miles Platting, MANCHESTER.
Inquiries Solicited.

**BOLDON GAS COALS.**

| | | |
|---|---|---|
| Yield of Gas per Ton. . | 10,500 | Cubic Feet. |
| Illuminating Power . . | 16·9 | Candles. |
| Coke . . . . . | 66·7 | Coke. |
| Sulphur . . . . . | 0·86 | Sulphur. |
| Ash . . . . . | 2·04 | Ash. |

As per Analysis by
Mr. JOHN PATTINSON, F.I.C., F.C.S.
For Prices, &c., apply to
**W. H. PARKINSON,**
THE HARTON COAL CO., LTD.,
NEWCASTLE-ON-TYNE.
Telegraphic Address: "PARKINSON, NEWCASTLE."

**THORNLEY GAS COALS**
WORKED BY THE
**WEARDALE IRON & COAL Co., Ld.**
OUT OF THEIR
THORNLEY AND WHEATLEY HILL COLLIERIES.
Analysis made by
Messrs. J. & H. S. PATTINSON.

| | | |
|---|---|---|
| Yield of Gas per Ton . . | 10,500 | Cub. Ft. |
| Illuminating Power . . . | 16·9 | Candles. |
| Coke (of good quality) . . | 67·5 | per Cent. |
| Sulphur . . . . . | 0·58 | ,, |
| Ash . . . . . | 2·73 | ,, |

For Price, &c., apply to the
**WEARDALE IRON & COAL Co., Ld.**
QUAYSIDE, NEWCASTLE-ON-TYNE.

**COKE-BREAKERS,**
PRICES REDUCED.
(THOMAS & SOMERVILLE'S PATENT)
With Elevators and Conveyors worked by Steam or Gas Engine.
**GEORGE WALLER & CO.,**
165, QUEEN VICTORIA STREET, E.C.;
*And at STROUD, GLOUCESTERSHIRE.*

**JAMES OAKES & CO.**
**ALFRETON IRON-WORKS, DERBYSHIRE,**
AND
**Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,**
Manufacture and keep in Stock at their Works (also large stock in London)
PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
Note.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts and Covers, and rendering Leakage impossible.

**HOLMSIDE**
**GAS COALS.**
**Present Daily Produce over 5000 Tons.**
*Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation*

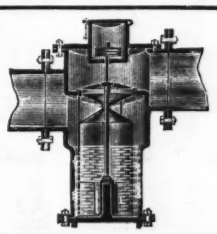
| | |
|---|---|
| Yield of Gas per Ton . . . | 11,205 Cubic Feet. |
| Illuminating Power | $16\frac{7}{10}$ Stand. Sperm. Candl. |
| Coke (of good & pure quality) | $13\frac{3}{4}$ Cwt. per Ton. |
| Sulphur . . . . . | A little over 1 per Cent. |
| Ash . . . . . | Under 1 per Cent. |
| Tar . . . . . | 163 lbs. (Avoir.) per Ton. |
| Ammoniacal Liquor | 103 lbs. (Avoir.) per Ton. |

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR
**PELTON GAS COALS.**
**Present Daily Produce available 3000 Tons.**
Of equal quality to the "Holmside" Coal, and also very largely used by many Gas Companies at Home and Abroad.
Both descriptions are shipped at Tyne Docks, and Dunston Staiths, River Tyne, also at North and South Docks, Sunderland.
These Coals may be bought through the Principal Merchants in England, or direct from
**MR. MARK ARCHER,**
**HOLMSIDE & SOUTH MOOR OFFICES,**
**NEWCASTLE-UPON-TYNE.**

**HARRIS & PEARSON,**
**STOURBRIDGE, ENGLAND,**
MANUFACTURERS OF
**FIRE-CLAY GAS-RETORTS, FIRE-BRICKS, LUMPS, & TILES of Every Description.**
GLAZED BRICKS AND PORCELAIN BATHS.

**JAMES MILNE & SON, Ltd.,**
**GAS ENGINEERS**
MILTON HOUSE WORKS EDINBURGH.
LONDON. —— LEEDS. —— GLASGOW.



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## UP-TO-DATE FURNACES
## AND SETTINGS.

**J. & H. ROBUS,** 20, Bucklersbury, London, E.C.

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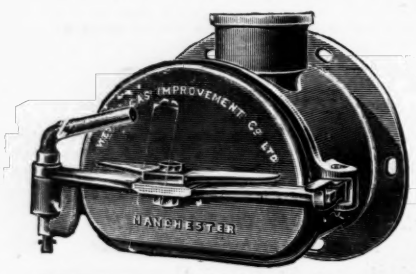
# WEST'S GAS IMPROVEMENT COMPANY, LTD.

ALBION IRON-WORKS, MILES PLATTING, MANCHESTER;
AND 104, QUEEN VICTORIA STREET, LONDON, E.C.




MAKERS OF **WEST'S MACHINERY** FOR
**CHARGING AND DRAWING GAS-RETORTS.**
WEST'S PATENT REGENERATOR SETTINGS.
WEST'S PATENT SILENT COKE CONVEYOR.
RETORT MOUTHPIECES WITH SELF-SEALING LIDS.

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WE EXHIBIT AT THE **PARIS EXHIBITION** OUR **INCLINED RETORT** SYSTEM.

MAURICE GRAHAM. Telegrams "ACCOUPLE" LEEDS.
**GRAHAM, MORTON & Co. Ltd.**
CONTRACTORS TO H.M. GOVERNMENT.
SEE OUR ILLUSTRATED CATALOGUE
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Works; BLACK BULL STREET, LEEDS.

WE EXHIBIT AT THE **PARIS EXHIBITION** OUR **INCLINED RETORT** SYSTEM.

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# MOBBERLEY & PERRY
## STOURBRIDGE.

Manufacture & supply best quality of
**Gas Retorts** (SEGMENTAL, HORIZONTAL, or INCLINED.)
Special Bricks & Blocks for GENERATOR & REGENERATOR FURNACES.
FIRE BRICKS, LUMPS, & TILES, BLUE STAFFORDSHIRE VITRIFIED BRICKS FOR PAVING, &c., &c.
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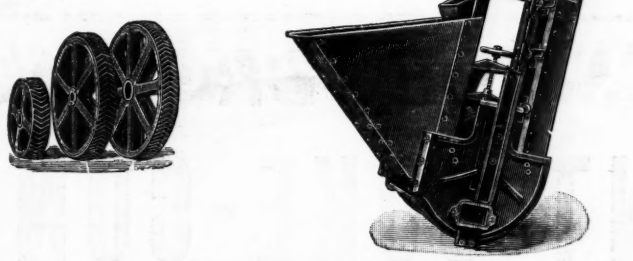

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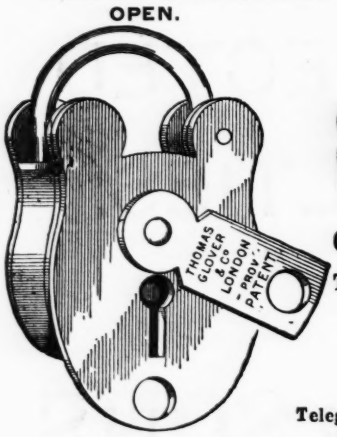


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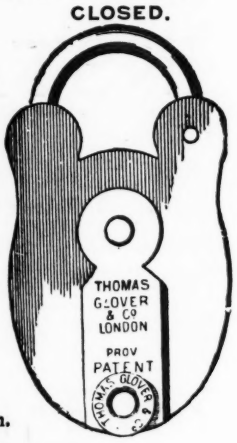


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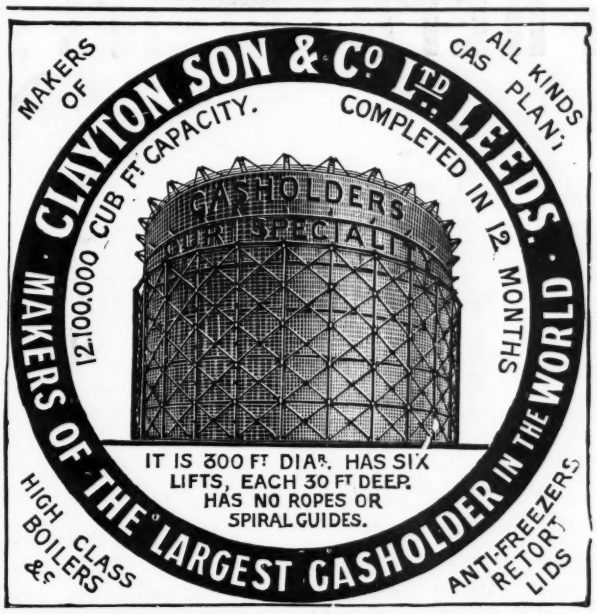
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(See also Advt. p. 1422.


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